

Programmable Control Products

VersaPoint* I/O System

Profibus-DP NIU

User's Manual, GFK-1911B

March 2010



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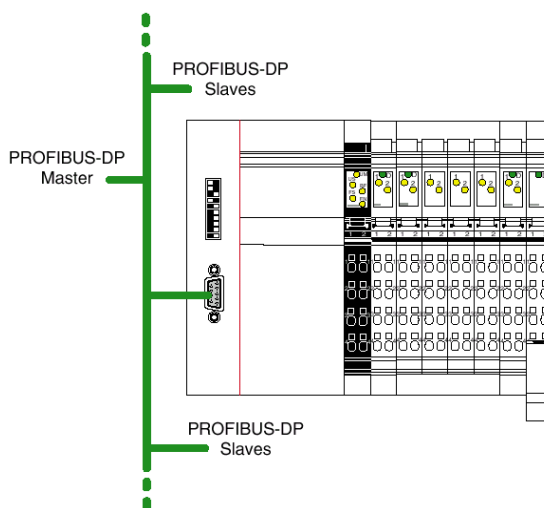
Contents

Chapter 1

Introduction

The VersaPoint product family is a modular automation system. With VersaPoint modules you can easily add one module to the next and build functional units that meet your automation requirements exactly.

A set of interconnected VersaPoint I/O modules can be selected to suit the application, and connected as a slave on a Profibus-DP network. The interface between the network and the modules is a VersaPoint Profibus-DP Network Interface Unit (NIU).



The NIU is located to the left of the other modules. Together, the NIU and the modules selected for the application function as an I/O Station. The I/O Station can include up to 63 I/O modules.

Within the VersaPoint station the bus connection, power supply, and power distribution for the devices connected to the bus terminal are realized by connecting modules together on the DIN rail.

Sensors and actuators are easily wired to the VersaPoint I/O modules via spring-clamp terminals on the modules' removable connectors. These connectors can be keyed so that they cannot be mixed up. If a module must be exchanged the wiring does not need to be removed. Just remove the connector from the terminal.

Features

Characteristic VersaPoint features are:

- Modules can be easily installed/interconnected without tools.
- Automatic creation of isolated groups, current, data, and safety circuits
- Open, flexible, and modular structure
- Modules of varying point counts can be combined to create a VersaPoint station that optimizes unit space while minimizing unit cost.

Advantages

VersaPoint design offers the following advantages:

- Reduced control cabinet space.
- The amount of costly parallel wiring is reduced. Within a station, voltage and data routing can be carried out without additional wiring.
- The modular structure makes it possible to assemble standard function blocks in advance. Different parts of the system can be operated independently of one another. This means that pretests can be carried out when the system is set up and that the whole system can be adapted and expanded.

I/O Station Capacity

- Up to 63 devices can be connected to an NIU (Depending on power consumption. See chapter 5).
- The sum of all input and output data can be up to 184 bytes per station.

What's In This Manual

This manual contains the instructions and reference information needed to plan and install a VersaPoint I/O Station on a Profibus-DP network.

Chapter 1 is a quick **introduction** to VersaPoint.

Chapter 2. The Profibus NIU, describes the Profibus Network Interface Unit module, which connects the VersaPoint I/O Station to the Profibus network.

Chapter 3. VersaPoint Modules, describes the parts and dimensions of VersaPoint I/O and power modules.

Chapter 4. Installation, describes basic VersaPoint module installation and cable connections.

Chapter 5 Power for the Station, explains how power is utilized by the station and routed among the modules.

Chapter 6. Diagnostics, describes in detail the indications of the NIU and module LEDs, as well as additional diagnostics features of the VersaPoint station.

Chapter 7. Configuration, describes the configuration options of the VersaPoint Profibus NIU.

Chapter 8. Communications, describes the data structures used for communications with the Profibus NIU.

Appendix A. Reference Data, summarizes the standard data for a VersaPoint Profibus I/O system..

Appendix B. Glossary explains many of the terms used in this manual.

Appendix C. Output Module Derating, describes how to calculate power loss and operating temperature limits for I/O modules.

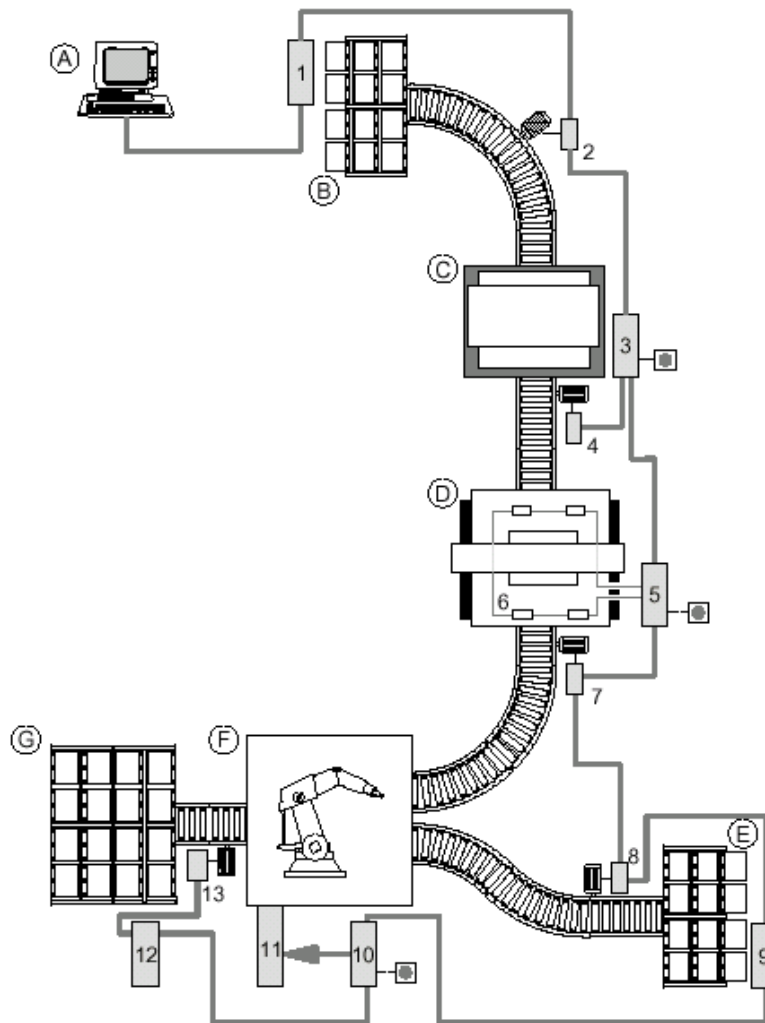
Other Documents You'll Need

These documents are available online at <http://www.ge-ip.com/>, and on the *Infolink for PLC* document library on CDs (catalog number IC690CDR002). Check the GE website for the most up-to-date document versions and other important product information.

Module Number	Module Description	Document Number
Discrete Input Modules		
IC220MDL641	Input 24VDC Positive Logic 2 Points	GFK-1901
IC220MDL642	Input 24VDC Positive Logic 4 Points	GFK-1902
IC220MDL643	Input 24VDC Positive Logic 8 Points	GFK-2000
IC220MDL644	Input 24VDC Positive Logic 16 Points	GFK-2001
IC220MDL661	Input 24VDC Negative Logic 2 Points	GFK-2002
Discrete Output Modules		
IC220MDL721	Output 24VDC Positive Logic 2.0A 2 Points	GFK-1903
IC220MDL751	Output 24VDC Positive Logic 0.5A 2 Ppoints	GFK-2003
IC220MDL752	Output 24VDC Positive Logic 0.5A 4 Points	GFK-1904
IC220MDL753	Output 24VDC Positive Logic 0.5A 8 Points	GFK-2004
IC220MDL754	Output 24VDC Positive Logic 0.5A 16 Points	GFK-1913
IC220MDL761	Output 24VDC Positive Logic 0.5A 2 Points	GFK-2005
Special Function Modules		
IC220BEM232	RS-232 Communications Module	GFK-2394
IC220BEM485	RS-485/422 Communications Module	GFK-2395
IC220MDD840	High-speed Counter 1 In/1 Out 24VDC	GFK-2052
IC220MDD841	Absolute Encoder Module	GFK-2125
IC220MDD842	Incremental Encoder Module	
IC220STR001	Motor Starter Direct, 1.5KW/400VAC	GFK-2134
IC220STR002	Motor Starter Direct, 3.7KW/400VAC	
IC220STR003	Motor Starter Reversing	
Analog Input Modules		
IC220ALG220	Analog In 15 Bit Voltage/Current 2 Channels	GFK-1906
IC220ALG620	Analog In 16 Bit RTD 2 Channels	GFK-2013
IC220ALG630	Analog In 16 Bit Thermocouple 2 Channels	GFK-2012
Analog Output Modules		
IC220ALG320	Analog Out 16 Bit Voltage/Current 1 Channel	GFK-1907
IC220ALG321	Analog Out 13 Bit Voltage 1 Channel	GFK-1908
IC220ALG322	Analog Out 13 Bit Voltage 2 Channels	GFK-2011
Power and Segment Terminals		
IC220PWR001	Power Terminal 24VDC	GFK-1909
IC220PWR002	Power Terminal Fused 24VDC	GFK-2006
IC220PWR003	Power Terminal Fused with Diag. 24VDC	GFK-2007
IC220PWR011	Segment Terminal 24VDC	GFK-1910
IC220PWR012	Segment Terminal Fused 24VDC	GFK-2008
IC220PWR013	Segment Terminal Fused W/Diag 24vdc	GFK-2009
IC220PWR014	Segment Terminal Elec Fused 24vdc	GFK-2010

Example Plant

The following example provides an illustration of how the VersaPoint I/O System may be applied. This example highlights the distributed nature of the VersaPoint product line as well as its ability to fit a variety of difficult applications within a single system.



Key:

- A Plant control
- B Material removal area 1
- C Press
- D Punching device
- E Material removal area 2
- F Welding robot
- G Material area 3
- 1, 3, 5, 6, 9, 10, 12 VersaPoint™ stations
- 2, 4, 7, 8, 13 Motor starter
- 11 Robot controller

Emergency stop switch

This example is a schematic diagram of a plant which is controlled by a host computer.

VersaPoint station 1 modules control the removal of material from area 1.

The motor starter (2) is directly connected to the remote bus. This controls a conveyor belt motor.

VersaPoint station 3 controls the press. As this machine must be particularly well protected, an emergency stop switch has been integrated.

VersaPoint station 5 controls the punching device. Station 6 is connected to station 5, and its modules monitor the status of the press. An emergency stop switch has also been provided here.

Two motor starters are connected at points (7) and (8). They control conveyor belt motors.

VersaPoint station 9 controls the removal of material from area 2.

A robot control system (11) is connected to the communications bus using VersaPoint station 10. An emergency stop switch has also been connected here.

VersaPoint station 12 controls the storage of material in area 3.

Motor starter 13 is directly connected to the remote bus and controls the conveyor belt motor.

Chapter 2

The Profibus NIU

This section describes the Profibus Network Interface Unit module IC220PBI002.

- The Profibus System
 - Typical Profibus-DP VersaPoint I/O Station
 - Structure of a VersaPoint I/O Station
- The Profibus-DP Network Interface Unit
 - Features
 - Items Used with the NIU
 - Ordering Information
- Connectors on the NIU
 - Profibus Connector
 - Power Connector
- DIP Switches on the NIU
- LEDs on the NIU
 - Diagnostics
- NIU Specifications

The Profibus System

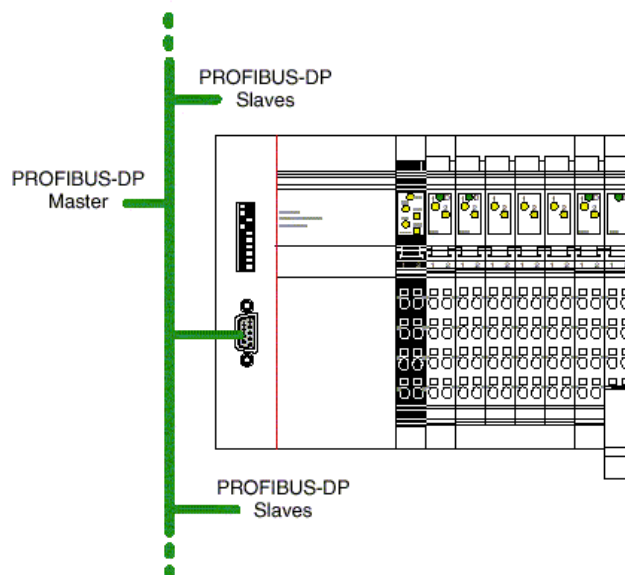
Profibus is a serial bus system for data transmission between control systems and distributed input and output modules, to which sensors and actuators are connected.

Profibus has a star tree structure. In the Profibus topology the single bus devices can be differentiated by means of their addressing. The communication profiles determine how the devices transmit their data via the bus.

Profibus DP is normally a single master system. It is designed for easy transmission of input and output data and specifically designed for communication between automation systems and the distributed I/O devices.

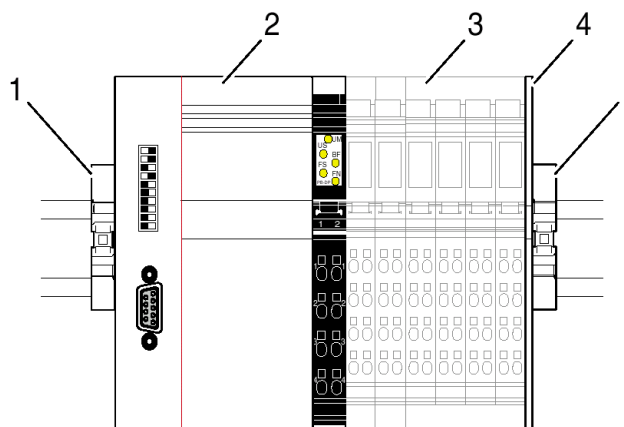
Typical Profibus-DP VersaPoint I/O Station

A set of interconnected VersaPoint I/O modules can be selected to suit the application, and connected as a slave on a Profibus-DP network. The interface between the network and the modules is a VersaPoint Profibus-DP Network Interface Unit (NIU) module.



The intelligent wiring method used in the VersaPoint modules allows I/O stations to be constructed easily and quickly. Normally, it is only necessary for the power supply units integrated in the Profibus NIU to be supplied with 24VDC on the input side. They generate the operating voltage required for the NIU itself and for the connected VersaPoint I/O modules.

Structure of a VersaPoint I/O Station

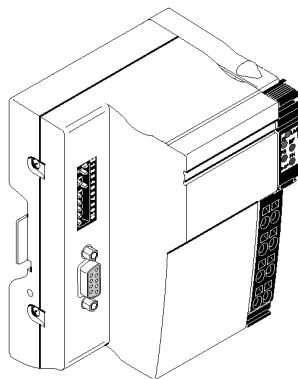


A VersaPoint station with a Profibus NIU consists of:

- (1) End clamps (part number IC220ACC313, supplied with the NIU)
- (2) Profibus-DP Network Interface Unit
- (3) Modules appropriate to the application
- (4) End plate (supplied with the NIU)

The Profibus-DP Network Interface Unit

The VersaPoint™ Profibus-DP Network Interface Unit (NIU), IC220PBI002, is the link between Profibus-DP and the VersaPoint station. This module is an enhanced version of the earlier Profibus-DP Network Interface Unit module IC220PBI001, which it replaces. Differences between the two versions are explained below.



Features

The Profibus-DP Network Interface Unit has the following properties:

- A maximum of 63 VersaPoint I/O modules can be connected to Profibus DP by simply plugging them in side by side next to the NIU. The NIU and the VersaPoint modules create a station. Check chapter 5 to verify power consumption.
- The sum of all input and output data can be up to 176 bytes per station for module IC220PBI002 with its DIP switch 8 in the ON position. The maximum is 184 bytes per station with DIP switch 8 in the OFF position. The maximum for module IC220PBI001 is 184 bytes.
- The NIU can be used at a baud rate of 9.6 kbps for Profibus DP with a maximum total expansion of 1200m (3937ft) or at baud rate of 12mbps with a maximum of 100m (328 ft). The NIU automatically adjusts to the speed specified by the Profibus master.
- Model IC220PBI002 also provides:
 - DP/V1 for Class 1 and Class 2 masters.
 - Acyclic communications with modules such as RS-232 modules in the process data channel.
 - Fail-safe values
 - Acknowledgement of I/O errors from the user program.
- Adaptation of the high byte/low byte format in 16-channel input and output modules.

Comparison of Features

The table below compares features of module IC220PBI02 in DP/V1 mode or DP/V0 mode (as selected with DIP switch 8) with the features of module IC220PBI001.

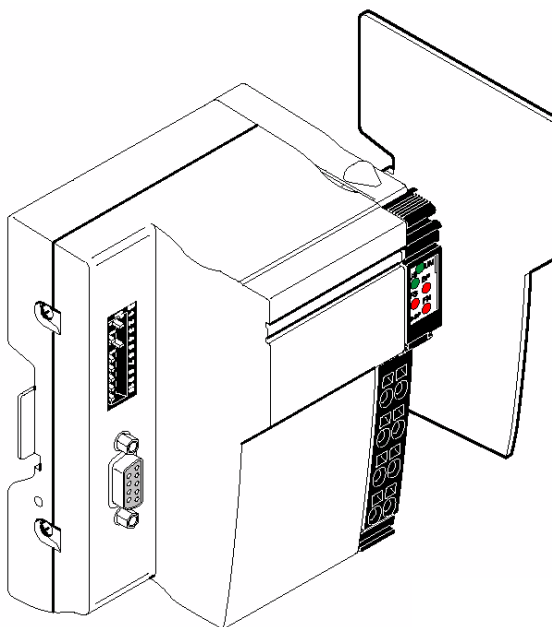
<i>Feature</i>	<i>IC220PBI002 in DP/V1 mode</i>	<i>IC220PBO002 in DP/V0 mode</i>	<i>IC220PB001</i>
PCP module operation	x	x	-
DPV1 Read and DP/V1 Write support (acyclic communication) Class 1 and Class 2 masters	x	-	-
Communication with PCP modules via normal process data (DP/VO)	x	x	-
Byte rotation for 16-point input and output modules for adaptation to the control system format	x	x	-
Byte rotation for 32-point input and output modules	firmware rev. B or later	firmware rev. B or later	-
Acknowledgement of bus stops	x	x	-
Acknowledgement of I/O errors	x	x	-
Stop response can be set with DIP switch	-	-	x
Stop response can be set with parameter telegram	x	x	-
Assignable station ID	firmware rev. B or later	-	-
Failsafe values even without connection to the PLC	firmware rev. B or later	-	-
Improved I/O diagnostics during startup	firmware rev. B or later	-	-

Items Used with the NIU

The Profibus NIU comes with an end plate, the latest GSD file, and one set of end clamps.

The end plate is installed at the end of the VersaPoint station, after the last module. It protects the station from electrostatic discharge and the user from dangerous voltage.

The power connector is ordered separately. See the ordering information below.



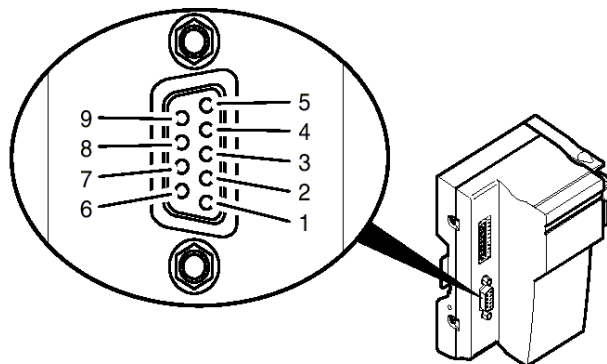
Ordering Information

IC220PBI002	Profibus Network Interface Unit (replaces model IC220PBI001)
IC220TBK087	Power connector (quantity 10)

Connectors on the NIU

Profibus Connector

A 9-position, D-SUB connector connects the NIU to the Profibus cable.



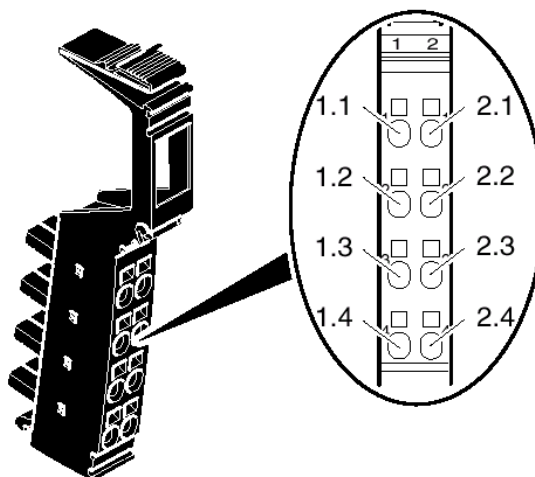
Pin	Assignment
1	Reserved
2	Reserved
3	RxD/TxD-P (+ receive/send data), cable B
4	CNTR-P (control signal for repeater), direction control
5	DGND (reference potential up to 5 V)
6	VP (supply voltage +5 V for terminal resistors)
7	Reserved
8	RxD/TxD-N (– receive/send data), cable A
9	Reserved

Line Terminal Resistors

Since Profibus is a serial bus system in a star-tree structure, the individual branches must be terminated with a terminal resistor. The NIU does not have an integrated resistor of this type. Many Profibus connectors are available with an integrated, switchable resistor. Please contact your GE Intelligent Platforms distributor to determine availability.

Power Connector

A power connector (IC220TBK087), ordered separately, is used to make power and ground connections to the NIU.



Pin assignments for this connector are listed below:

Assignment of the NIU terminal points

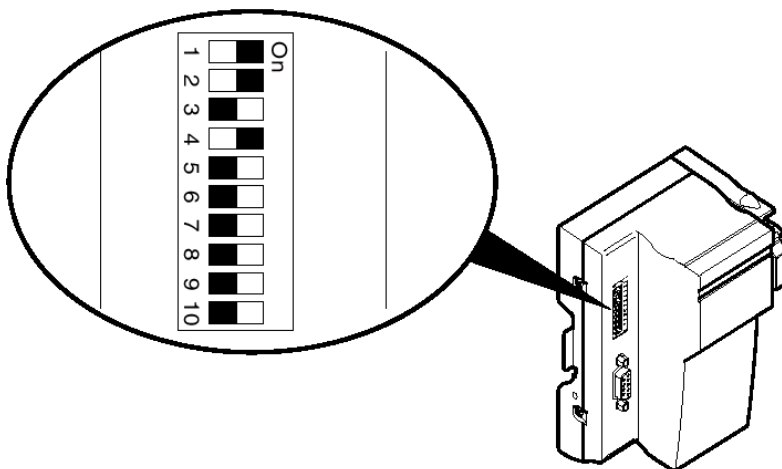
Terminal	Assignment
1.1, 2.1	Segment supply (+24VDC)
1.2, 2.2	Main supply, NIU supply, communications power and interface supply (+24VDC)
1.3, 2.3	Reference potential
1.4, 2.4	Functional earth ground (FE)

NIU Power

The NIU acts as a power terminal, supplying the logic and module power for some or all of the of the I/O modules in the station, as well as the sensors and actuators. Some stations will also use additional power/segment terminals, depending on the needs of the application. See chapter 5 for additional details.

DIP Switches on the NIU

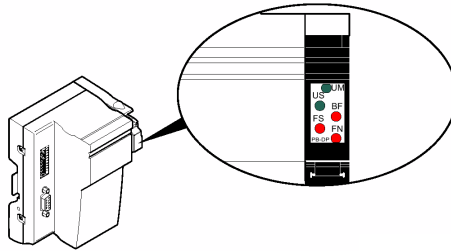
The 10-position DIP switch on the NIU module is used to set the Profibus address. In addition, switch 8 can be used to select the operating mode of Profibus NIU IC220PBI002. For model PBI001, the same switch specifies the error response of the NIU.



Switches	Meaning
1 to 7	Profibus Address in binary format (= 0 to 127 in decimal format) Switch 1 defines the least significant bit (2^0) and switch 7 defines the most significant bit (2^6).
8	For Module IC220PBI002: Sets the operating mode. With this switch in the Off position (the default), this module can directly replace module version IC220PBI001. With this switch in the On position, this module operates in DP/V1 mode. For Module IC220PBI001: Behavior if a data error occurs in the station (local bus error): ON = data transmission is stopped after a number of attempts. OFF = the station constantly attempts to start data transmission. If DIP switch 8 is in the ON position, a POWER DOWN/POWER UP must be executed on the NIU so that it will restart. There is no automatic restart after the error has been removed.
9 to 10	Reserved, both switches must be in the OFF position.

LEDS on the NIU

The diagnostic LEDs on the NIU indicate the type and location of errors.



The module is functioning correctly if all of the green LEDs are on.

Once errors have been removed, the indicators immediately display the current status.

NIU LED	Color	Meaning
UM	Green	On = supply voltage in the main circuit for the NIU, communications power and interfaces present. Off = main circuit supply not present.
US	Green	On = 24 V segment circuit supply present
BF	Red	On = No communication on Profibus. Off = no error. Flashing = PLC stopped, outputs default to safe values.
FS	Red	Defines the function of the FN LED: FS ON: FN indicates the type of error. FS OFF: FN indicates the error number
FN	Red	Off = no error. If flashing, the number of pulses indicates the type of error or the error number, depending on whether FS is on or not

Diagnostics

The NIU provides the following standard Profibus and device-related diagnostics.

Error Type	Meaning
1	Parameter error on Profibus (SET_PRM telegram)
2	Configuration error on Profibus (CHK_CFG telegram)
3	Configuration error in the station
4	Error within the station
5	Module error
6	Parameter error on local bus
7	EEPROM error

DPV1 Communications for Profibus NIU IC220PBI002

If the DP/V1 communications features of Profibus NIU IC220PBI002 are enabled by configuration and if DIP switch 8 on the module is set to the On position, the NIU supports enhanced DP/V1 communications with the master.

DP/V1 expands the cyclic data exchange function according to IEC 61158 to include acyclic services. This makes it easy to operate even complex devices.

The Profibus NIU prepares the data records, which are sent via DP/V1 from the master, and provides them to the specified modules in the I/O Station. The NIU converts data from the modules into DP/V1 telegrams for the Profibus master.

Masters with DP/V1 ability include the PACSystems RX3i Profibus Master Module, IC695PBM300, and the Series 90-30 CPU model IC693CPU366. Both of these masters can use three types of COMMREQ (Communications Request) functions in the application program to communicate with the Profibus NIU:

DPV1 Read Request	Performs a DPV1 read request from a slave device (such as the Profibus NIU).
DPV1 Write Request	Performs a DPV1 write request to a slave device.
DPV1 Alarm Request	Acknowledges a DPV1 alarm request.

NIU Specifications

General	
Housing dimensions (width x height x depth)	91mm x 120mm x 71.5mm (2.874in. x 4.724in. x 2.795in.)
Degree of protection	IP 20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536

System Information	
Number of devices per station	63, maximum
Sum of all I/O data per station, maximum	176 bytes for IC220PBI002 in DP/V1 mode. 184 bytes for IC220PBI001, or for PBI002 with DIP switch 8 set for operation in PBI001 mode
Maximum NIU current for supplying the I/O module logic	2A at U_L
Maximum additional current for supplying the analog terminals	0.5A at U_{ANA}
Profibus-DP Interface	Copper cable (RS-485), connected via SUB-D shield connector; supply electrically isolated, shielding directly connected with functional earth ground.

Chapter 3

VersaPoint Modules

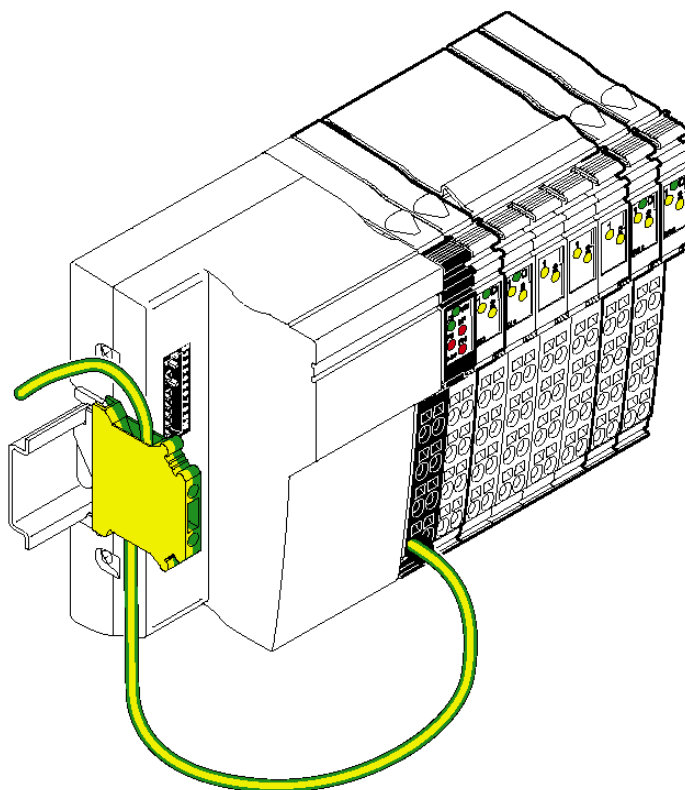
This chapter describes the parts and dimensions of VersaPoint modules.

- Modules in a VersaPoint Station
- Parts of a VersaPoint Module
- The Electronics Base
- Diagnostics and Status Indicators
- Connectors
- Module Labeling
- Module Dimensions

Modules in a VersaPoint Station

A VersaPoint I/O Station begins with a Network Interface Unit (NIU). The NIU module is the first module on the DIN rail, at the left end of the I/O Station. It is shown here with the required grounding to the DIN rail. See chapter 2 for more information about the Profibus-DP Network Interface Unit. The NIU performs all the data-handling and communications functions for the I/O Station.

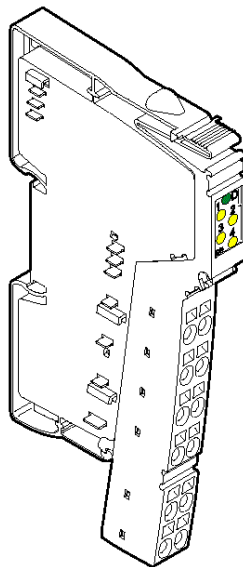
The rest of the station is made up of a group of I/O modules that can be selected to exactly fit the needs of the application.



Input/Output Modules

Many different types of I/O modules are available. This enables you to build the station in a modular way so that it meets the application's requirements.

Example of a digital input module: IC220MDL642



Terminal Points

Depending on the module, input/output modules have terminal points to accommodate 2-, 3-, and 4-wire sensors or actuators. Connections are made to Terminal Strips, which are ordered separately.

Protection

For output modules, surge voltage protection is provided by a fuse in the Power Terminal module, or by an external fuse. The value of the fuse must be such that the maximum load current is not exceeded. For the maximum permissible load current of an I/O module please refer to the module's data sheet.

LEDs

The diagnostic and status indicators on I/O modules provide information on the status of inputs and outputs.

Interfacing to Functional Earth Ground (FE)

There is no interfacing to functional earth ground (FE) in the module, i.e. no direct connection is made with FE when the module is mounted on a grounded DIN rail.

Grounding

A module is grounded via the voltage jumper FE when snapping it onto the previous module. Additional I/O module grounding is not required.

Electrical Isolation

Electrical isolation is not provided by VersaPoint I/O modules. A Power Terminal module must be used for this purpose.

Voltage Ranges

Low-level signal terminals are available for different voltage ranges. To utilize different voltage ranges within a station, a new power terminal must be used for each range.

Power Losses for I/O Modules

Power Loss of the Electronics

The electronics power loss of an I/O module can be calculated following the formula in the module's datasheet. The power loss of the module must not exceed the power loss of the housing.

Power Loss of the Housing

The power loss of the housing indicates the maximum power loss allowed. The maximum power loss is indicated in the module's datasheet. This power loss can be dependent or independent of the ambient temperature. If the power loss of the housing depends on the ambient temperature, a permissible operating temperature range can be calculated using the formula in the module's datasheet.

Permissible Operating Temperature Range

Depending on the power loss of the housing and the power loss of the electronics at a certain current, the temperature up to which the module can be operated with this current can be calculated. Please see the module datasheets for specific information.

See appendix C for example calculations.

Analog Modules

Shield

The connectors of analog modules have a special shield connection to shield the cables.

Configuration

The modules for analog signals operate with a set of default parameters unless they are reconfigured for the application. Each module's defaults are listed in its datasheet.

Diagnostics for Analog Input Modules

Analog input modules have overrange recognition in all measuring ranges. Open circuit diagnostics are also available for some analog input modules. If extended diagnostics are available for a specific module, they are listed in the module's datasheet. Analog error messages include:

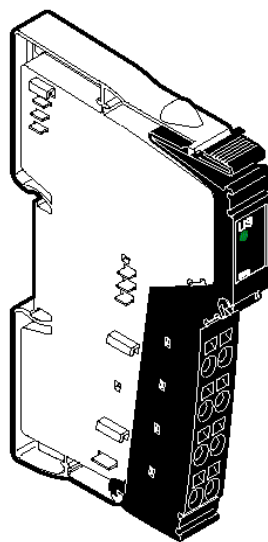
- Under-range
- Open circuit
- Measured value invalid
- Configuration invalid
- Terminal defective
- Over-range.

Power Terminal Modules

Power Terminal modules can be placed in an I/O Station to provide additional power, to electrically isolate different circuits, or to create areas with different voltages (ie: 24VDC versus 120VAC) within a station. Multiple Power Terminal modules can be used in an I/O station.

A Power Terminal module supplies voltage for both the main circuit and the segment circuit. See chapter 5 for more details.

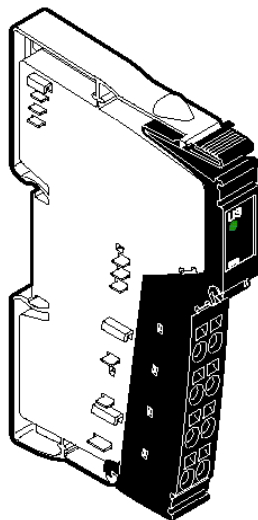
Example: 24VDC Power Terminal



The main power circuit should be protected. If a protected Power Terminal (IC220PWR002 or PWR003) is not used, the 24V supply must be externally protected.

Segment Terminal Modules

Segment Terminal modules can be used to create a segment circuit within the main circuit. The segment circuit allows the separate supply of power outputs (e.g., motor contactors), digital actuators, and digital sensors. With a segment terminal you can also control the segment circuit and switch it on or off, e.g., using emergency stop loops. Segment Terminal modules can only be used with 24V power.



Segment Terminals do NOT provide electrical isolation. A Power Terminal module must be used for that purpose.

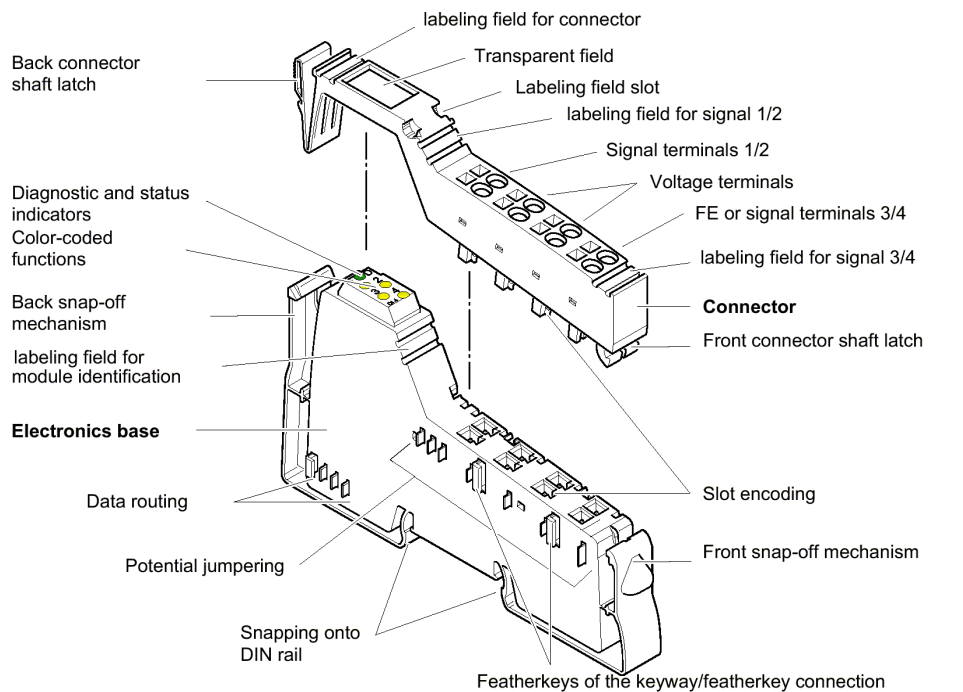
Segment terminals can only be used with 24V power.

The connection between the main circuit and the segment / auxiliary supply requires a jumper wire or external switch. Segment terminals have terminal points for the connection of a jumper or switch. When using a standard segment terminal, (IC220PWR011), the segment circuit is not protected! The 24V supply must be externally protected. See "Power Terminals".

Segment terminals with internal fuse protection (IC220PWR012, 013, and 014) are also available.

Parts of a VersaPoint Module

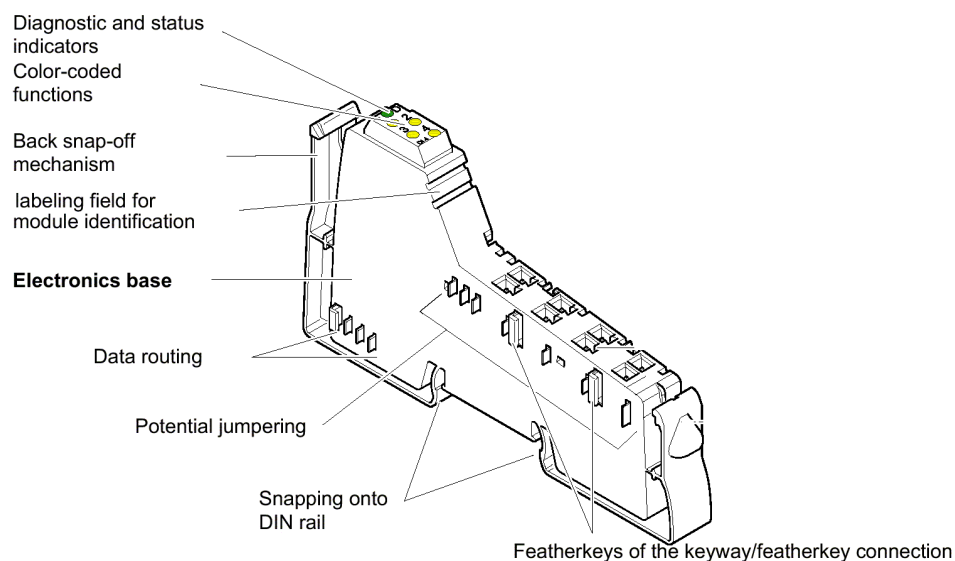
A VersaPoint I/O or power module consists of an electronics base and plug-in connector.



The Electronics Base

The electronics base holds the entire electronics for the VersaPoint module and the voltage and data routing.

As all the modules are snapped onto the DIN rail, there is a secure interface between the modules. Voltage and current for station operation are routed through the jumpers on each module, which are indicated in the following illustration. This functionality is explained in detail in chapter 5.



Built-in snapping mechanisms on the electronics base make it easy to install on the DIN rail without the use of tools. (Please see the installation instructions in chapter 4).

Diagnostic and Status Indicators

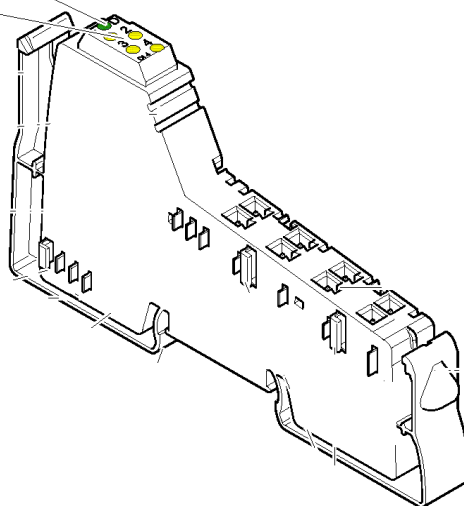
All modules have diagnostic and status indicators for rapid local error diagnostics.

The diagnostic indicators (red/green) indicate the status of the modules. A module is operating normally if all its Diagnostic (D) LEDs are solid green.

The status indicators (yellow) display the status of the relevant inputs/outputs for the connected device. LEDs are described in detail in chapter 6.

Diagnostic and status indicators

Color-coded functions



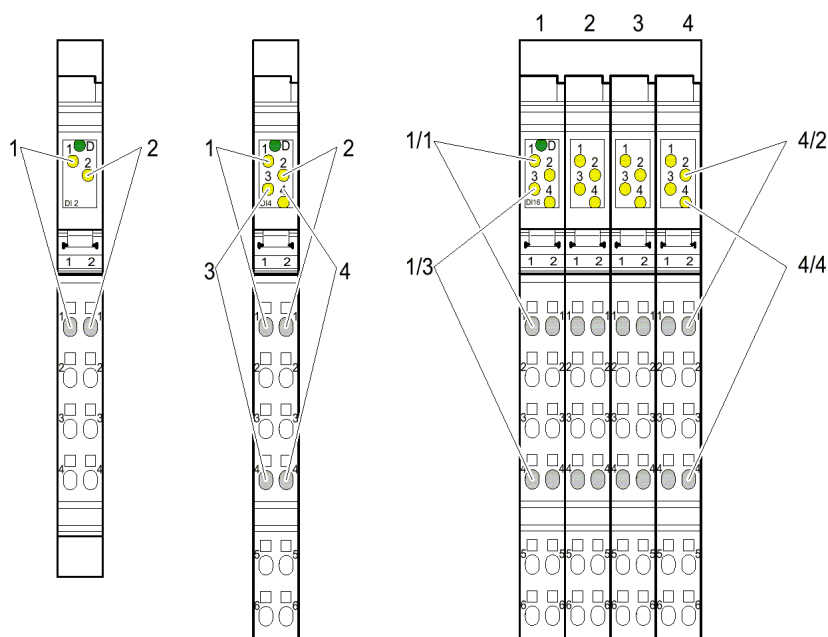
Module Color Coding

The area surrounding each module's LEDs is color-coded to provide an indication of the module's function. The following table explains this color-coding.

Color	Function
Gray	Analog
Blue	Digital - DC
Red	Special function
Orange	Digital mixed
Black	Power terminal / segment terminal / NIU

Status LEDs and I/O Points

The illustration below shows the relationship between the status LEDs on a module and the module inputs or outputs.



In general, an I/O module's status LEDs appear over their associated terminals. In cases where two I/O points are terminated in the same column (for 4 and 16 point modules), the LED's relative position (top or bottom) indicates the I/O point it is associated with.

For a single-width module with 4 inputs or outputs (middle module in the illustration above), the LEDs and terminal points are associated as follows:

LED 1	Terminal point 1.1
LED 2	Terminal point 2.1
LED 3	Terminal point 1.4
LED 4	Terminal point 2.4

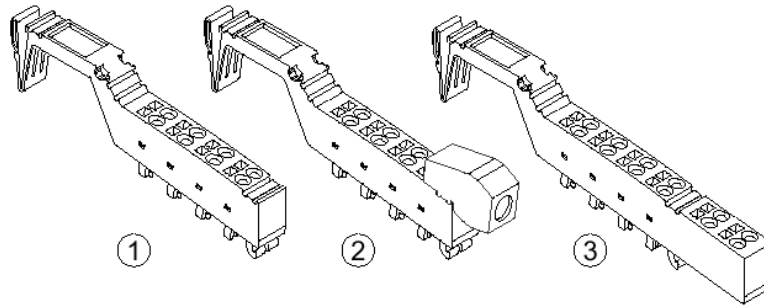
On the four-slot module, LED 2 on slot 4 is indicated. The LED belongs to input 14 on terminal point 4/2.1 (slot 4 / terminal point 2.1)

Connectors

The connection of the I/O or supply voltages is made by using a connector that can be plugged on or off the modules.

Connector Types

The following connector types are available:



(1) Standard connector (IC220TBK082, 085, 087)

The standard connector is used for the connection of two signals in 4-wire format (e.g., digital input/output signals). The standard connector housing is also used for power and segment terminals and relay terminals, although the types are NOT interchangeable.

(2) Shield connector (IC220TBK061)

This connector is used for signals connected using shielded cables (e.g., analog I/O signals, high-speed counter inputs, network cable). The FE or shielding is connected by a shield clamp.

(3) Extended, connector (IC220TBK122, TBK123)

This connector is used for the connection of four signals in 3-wire format (e.g., digital inputs).

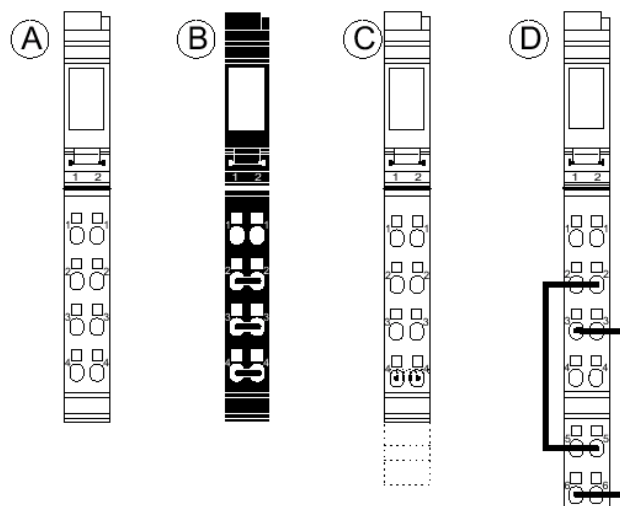
Regardless of the width of the electronics base, the connectors are provided with a standard width. Wider modules may require multiple connectors.

Connector Identification

Connectors have terminal points that are color coded corresponding to their functions:

Color	Terminal point signal
Red	+
Blue	–
Green	Functional earth ground

Internal Structure of the Connector



- A Standard connector (IC220TBK082, 085)
- B Connector for power and segment terminals (IC220TBK087)
- C Shield connector (IC220TBK061) for analog modules
- D Extended connector (IC220TBK122, TBK123)

The dark lines shown on connectors B and D above indicate jumper connections. These jumpers are internal to the connectors.

The shield connector is jumpered through the shield connection. All other connectors are jumpered through module point connection.

To avoid a malfunction, only snap a suitable connector on a module that is appropriate for this connector. Refer to the module-specific data sheet to select the correct connectors.

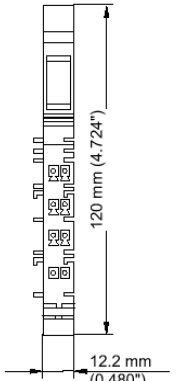
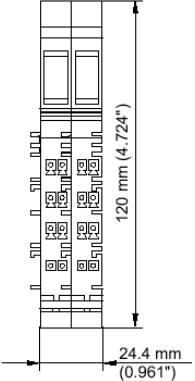
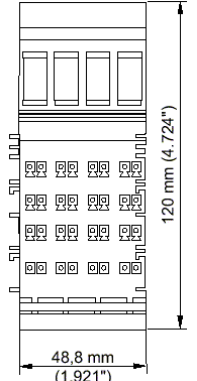
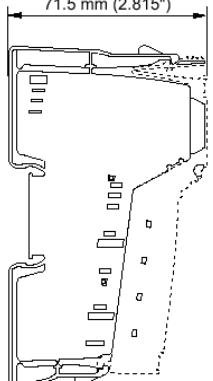
A supply connector must not be placed on a module that is to be used with an extended connector. This will cause a short circuit between two signal module points (1.4 - 2.4).

Place only supply connectors on supply modules. Do not use the standard connectors! When the terminal points are jumpered in the supply connector, power is carried through the jumpering in the connector and not through the printed circuit board of the module.

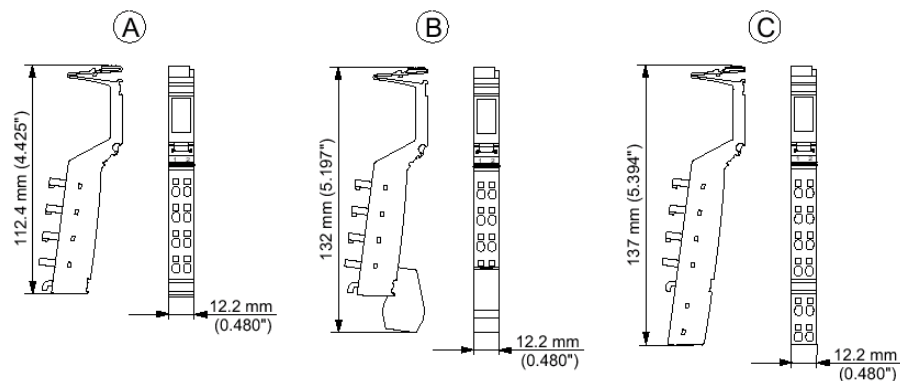
Module Dimensions

The module dimensions are determined by the dimensions of the electronics base and the dimensions of the connector.

When a connector is plugged in, each module depth is 71.5mm (2.795 in.).
The height of the module depends on the connector used.

Single Housing	Double Housing	Wide Housing	Depth, All
			

Connector Dimensions



Key:

- A. Standard connector (IC220TBK082, IC220TBK085, IC220TBK087)
- B. Shield connector (IC220TBK061)
- C. Extended connector (IC220TBK122, IC220TBK123)

The depth of the connector does not influence the overall depth of the module.

Chapter 4

Installation

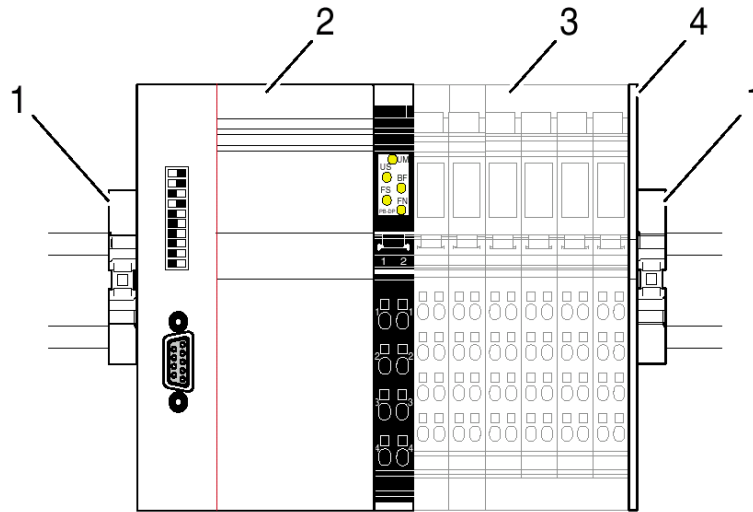
This chapter describes basic VersaPoint module installation and cable connections. Please refer to chapter 5 for more information about power connections for the I/O Station.

- Parts of a VersaPoint I/O Station
- Planning module sequence in the I/O Station
- Power for the station
- Setting the NIU switches
- Keying
- Installing modules on the DIN rail
- Removing modules
- Connecting unshielded cables
- Connecting shielded cables
- Grounding
- Connecting the Profibus cable at the NIU
- Connecting power at the NIU
- Replacing power and segment terminal fuses
- Connecting sensors and actuators
- Module labeling

Parts of a VersaPoint I/O Station

A VersaPoint station with a Profibus Network Interface Unit consists of:

- (1) End Clamps (supplied with NIU)
- (2) Profibus NIU
- (3) Modules appropriate to the application
- (4) End Plate (supplied with the NIU)



Mount modules side by side on a 35mm (1.378in.) standard DIN rail. No tools are required.

Do not set up the station while the power is connected. Before setting up a VersaPoint station or inserting a module, be sure the entire station is disconnected from the power. Be sure the entire station is reassembled before switching power on.

End Plate

The VersaPoint I/O Station must be terminated using the end plate that is supplied with the Network Interface Unit module. The end plate does not have an electrical function. It protects the station from ESD pulses and the user from dangerous voltages.

End Clamps

Install end clamps on both ends of the station to hold it in place on the DIN rail. End clamps are supplied with the NIU. If additional clamps are required, they are available as GE Intelligent Platforms part number IC220ACC313.

Planning Module Sequence in the I/O Station

The NIU is the first module in the station. The sequence of the other modules should be planned carefully. Within a main circuit, place the I/O modules with the highest current consumption (U_S) first. For example:

- Discrete output modules with 8-slot housings
- Discrete output modules with 2-slot housings
- Discrete input modules with 8-slot housings
- Discrete input modules with 2-slot housings
- Special-function modules
- Analog modules

This approach is advantageous in that the high supply current does not flow through the entire main circuit.

Locations for Analog Modules

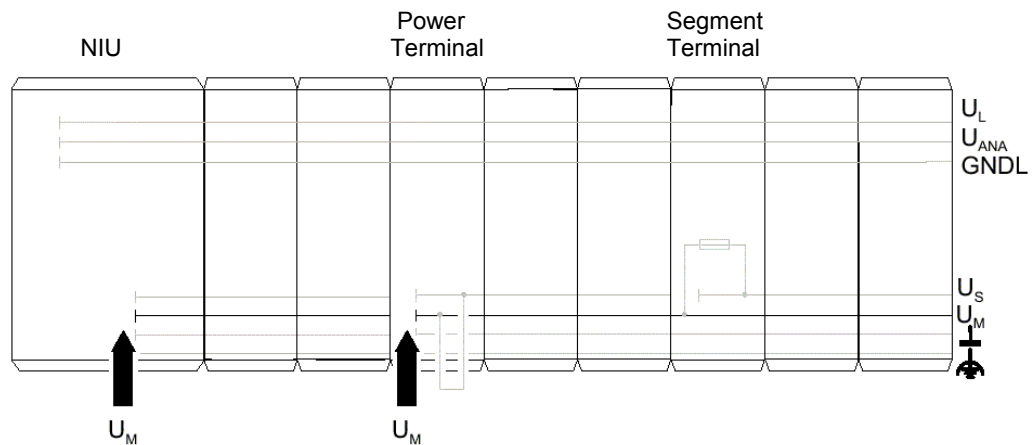
High current flowing through voltage jumpers U_M and U_S increases the temperature of the voltage jumpers and the inside of the module. Note the following instructions to keep the current flowing through the voltage jumpers of the analog modules as low as possible:

It is recommended that each analog module have a separate main circuit. If this is not possible and it is necessary to use analog modules in a main circuit together with other modules, place the analog modules at the end of the main circuit (to the right of other modules).

This practice is particularly important for the thermocouple module IC220ALG630. Internal module heating falsifies the temperature of the internal cold junction. Therefore, position this module after all of the other modules to minimize the current flowing through all voltage jumpers.

Power for the Station

The Profibus NIU receives power from the Profibus connection. This Profibus power supplies the NIU, and can also supply the logic and analog power for the I/O Station. A station may also include one or more Power Terminal and Segment Terminal modules. Power Terminal modules must be connected to external power. Segment Terminal modules draw their power from the main supply within the station, and are not connected to external power.



Please see chapter 5 for more information about station power.

Voltage supplies are connected using unshielded cables as described previously.

Electrical isolation

If electrical isolation is required between logic and I/O you must provide the NIU supply U_M and the I/O supply U_S from separate power supplies.

If various electrically isolated areas are required within a VersaPoint station, additional power terminals that draw their current from separate power supplies must be used.

The correct method of providing and distributing power to the station depends on the needs of the application. See chapter 5 for detailed information about power sources and power distribution in the VersaPoint I/O station.

Use power supplies with safe isolation!

Use power supplies that ensure safe isolation between primary and secondary circuit (according to EN 50178).

For additional voltage supply specifications refer to the data sheets of the NIUs and power terminals.

Voltage supplies are connected using unshielded cables as described previously. For the connector assignment of the supply voltage connections please refer to the module-specific data sheets of NIU, power terminals, and segment terminals.

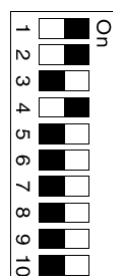
Dangerous voltage!

When the power terminal is removed, the metal contacts are freely accessible. With 120V or 230V power terminals, it should be assumed that dangerous voltage is present. You **must** disconnect power to the station **before removing** a terminal!

If these instructions are not followed, there is a danger of damage to health and danger of a life-threatening injury.

Setting the NIU Switches

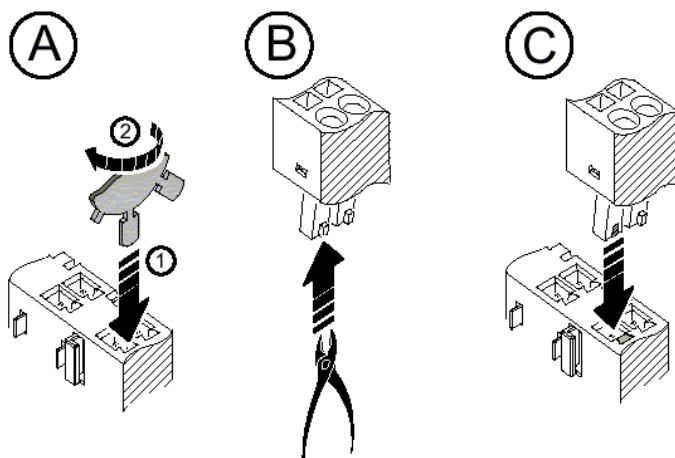
Configure the hardware using the 10-position DIP switch on the NIU module.



Switches	Meaning
1 to 7	Profibus Address in binary format (= 0 to 127 in decimal format) Switch 1 defines the least significant bit (2^0) and switch 7 defines the most significant bit (2^6).
8	For Module IC220PBI002: Sets the operating mode. With this switch in the Off position, this module can directly replace module version IC220PBI001. With this switch in the On position, this module operates in DP/V1 mode. The On position matches the NIU's default configuration. For Module IC220PBI001: Behavior if a data error occurs in the station (local bus error): ON = data transmission is stopped after a number of attempts. OFF = the station constantly attempts to start data transmission. If DIP switch 8 is in the ON position, a POWER DOWN/POWER UP must be executed on the NIU so that it will restart. There is no automatic restart after the error has been removed.
9 to 10	Reserved, both switches must be in the OFF position.

Keying Connectors and Modules

You can prevent the mismatching of any connector by keying the base and the connector using module keys (ordered separately, IC220ACC005 quantity 100).



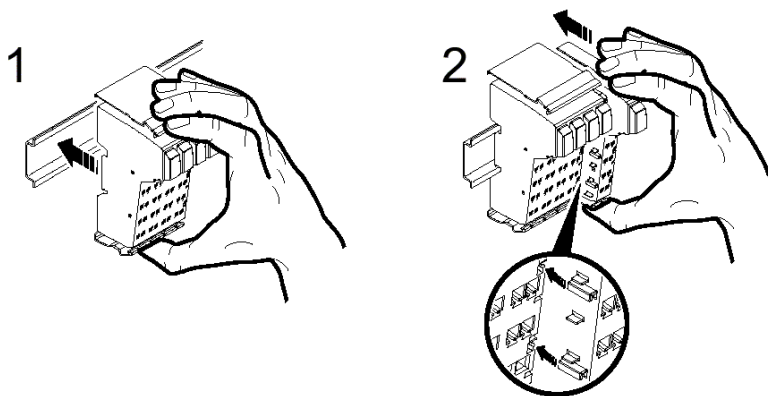
- A. Plug a coding key into the keyway in the base (1) and turn it away from the small plate.
- B. Use a pair of cutters to cut off the keying tab from the connector.

Installing Modules on the DIN Rail

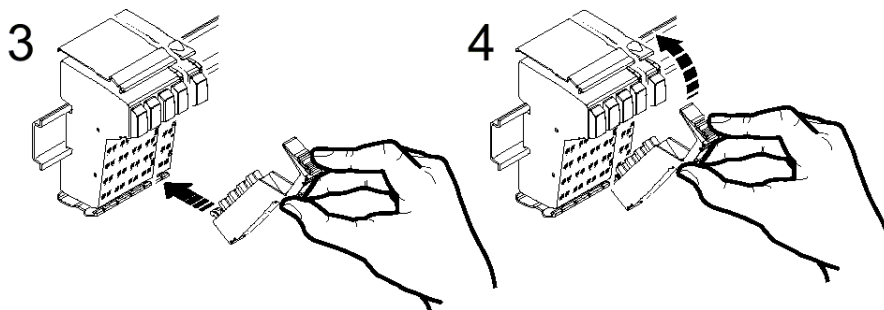
Mount modules side by side on a 35mm (1.378 in.) standard DIN rail.

- First, attach the electronics bases to the DIN rail by pushing the base straight-in towards the rail (1).

Be sure that **all** featherkeys and keyways on adjacent modules are interlocked (2). First, align the featherkey of the module with the keyway of the previous module. Then, attach the new module to the DIN rail by pushing it straight in toward the rail. Do not twist or pivot the module during installation; that may damage the modules.



- Next, attach the Terminal Strip to the module. First, place the front latch in the front snap-on mechanism (3).



Then pivot the top of the Terminal Strip towards the module until the back latch snaps into place (4).

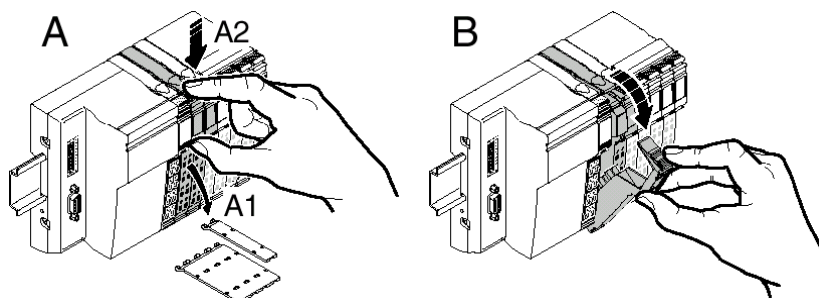
The keyways of a module do not continue on the Terminal Strip. When snapping on an module, there must be no Terminal Strip on the left-hand side of the module. If a Terminal Strip is present, remove it before installing the next module.

Removing Modules

When removing a module, follow the steps shown below:

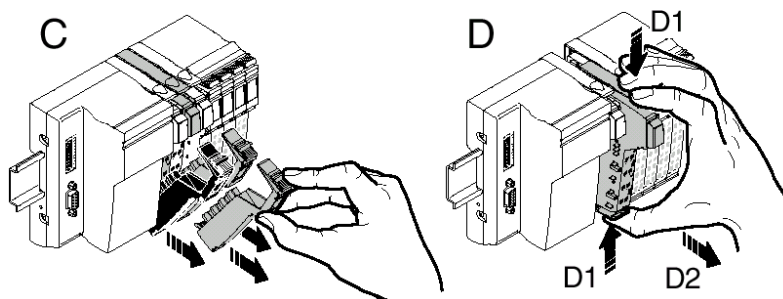
- If there is a module label present, remove it (A-1, below).

If the module has more than one Terminal Strip, all of these must be removed. The following describes how a single-slot module is removed.



Lift the Terminal Strip by pressing on the connector latch (A-2).

- Remove the Terminal Strip (B).
- Remove the left-adjacent and right-adjacent Terminal Strips of the neighboring modules (C). This prevents the potential routing featherkeys and the keyway/featherkey connection from being damaged and creates more space for accessing the module.



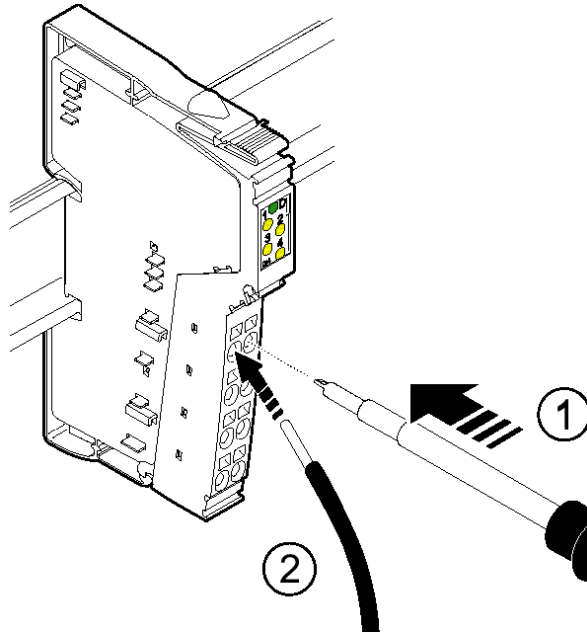
- Press the release mechanism, and remove the module from the DIN rail by pulling it straight back (D-2).
- To remove the NIU, the left end clamp must be removed first.

Replacing a Module

If you want to replace a module within the VersaPoint station, reverse the removal procedure above.

Connecting Unshielded Cables

Unshielded cables for I/O devices and supply voltages are connected using the spring-clamp terminals. Signals up to 250VAC/DC and 5A with a conductor cross-section of 0.2mm² to 1.5mm² (AWG24 – 16) can be connected.



For terminal assignments, please consult the appropriate module data sheet.

Follow these steps when wiring:

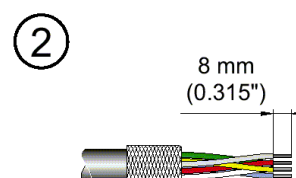
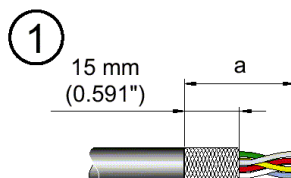
- Strip 8mm (0.3in.) off the cable. Module wiring is normally done without ferrules. However, it is possible to use ferrules. If using ferrules, make sure they are properly crimped.
- Push a screwdriver into the slot for the appropriate connection (#1 above) so that you can plug the wire into the spring opening.
- Insert the wire (#2 above). Pull the screwdriver out of the opening. The wire is clamped.

After installation, you should label the wires and Terminal Strips as described later in this chapter.

Connecting Shielded Cables

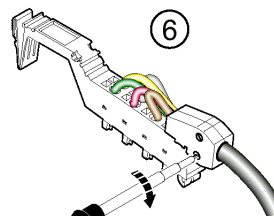
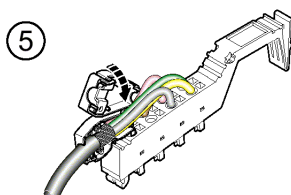
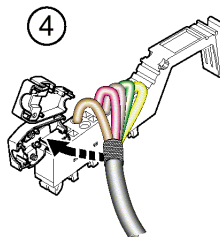
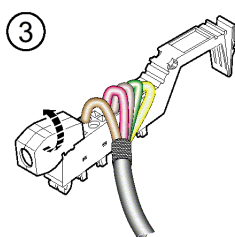
Observe the following when installing shielding:

- Strip the outer cable sheath to the desired length (#1a below). The appropriate length depends on the connection position of the wires and whether there should be a large or a small space between the connection point and the shield connection.



- Shorten the braided shield to 15mm (0.6 in.) (#1 above).
- Fold the braided shield back over the outer sheath. (#2 above)
- Remove the protective foil.
- Strip 8mm (0.3in.) off the wires. (#2 above)

Connecting Shielded Cables to the Shielded Terminal Strip



- Open the shield connector (#3 above).
- Check the orientation of the shield clamp in the Shielded Terminal Strip and change its position if necessary (see below for instructions).
- Place the cable with the folded braided shield in the shield connector. (#4 above)

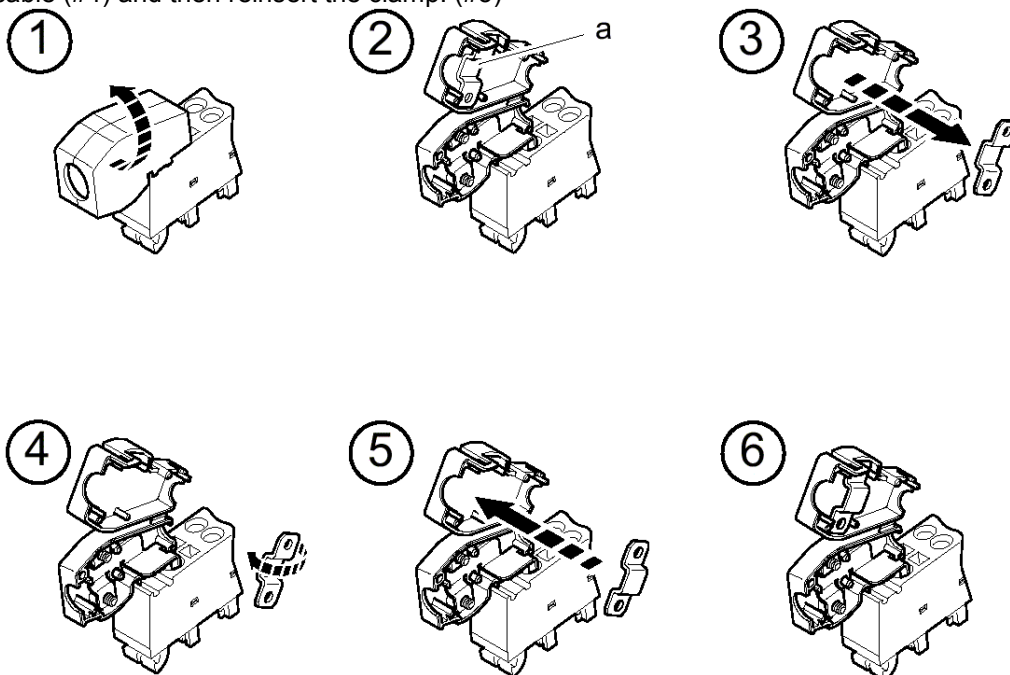
- Close the shield connector (#5 above).
- Fasten the screws for the shield connector using a screwdriver. (#6 above).

Repositioning the Shield Clamp

The shield clamp (2a, below) in the shield connector can be adjusted to accommodate thin or thick cable. The shield connection is delivered with the clamp positioned for the connection of thicker cables (#2 below). In that position, the bend in the clamp faces away from the cable. For thinner cables the bend in the clamp faces towards the cable (#6 below).

If you need to change the alignment of the shield clamp, proceed as shown below:

- Open the shield connector housing (#1).
- Remove the clamp (#3), turn the clamp according to the cross-section of the cable (#4) and then reinsert the clamp. (#5)



Grounding

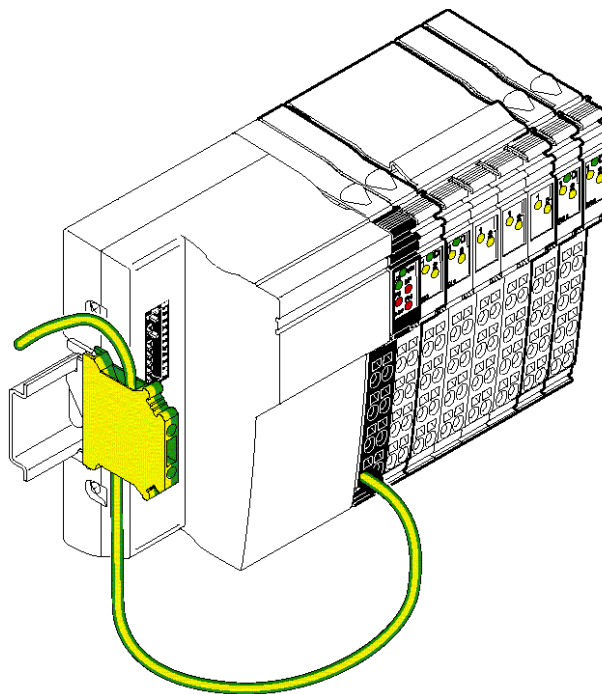
All devices in a VersaPoint station must be grounded so that possible signal interference is shielded and discharged to ground. A wire of at least 1.5mm^2 (16 AWG) must be used for grounding.

Grounding the NIU and Power Modules

The NIU, power terminals, and segment terminals have an FE spring (metal clip) on the bottom of the electronics base. These springs create an electric connection to the DIN rail. VersaPoint I/O modules are automatically grounded via the FE voltage jumper when they are connected to other modules. The FE voltage jumper (functional earth ground) runs from the NIU through the entire VersaPoint station. The function of FE is to discharge interference. It does not provide shock protection.

Required Additional Grounding

To ensure a reliable ground connection even if the DIN rail is dirty or the metal clip damaged, GE Intelligent Platforms recommends grounding the NIU to a DIN rail-mounted grounding terminal block, via the FE terminal point.



Installing the Profibus Cable

When laying the Profibus cable, note the following:

- Do not lay signal and bus cables parallel to power cables or in bundles with power cables.
- Lay Profibus cables and cables with direct voltages > 60V and alternating voltages > 25V in separate bundles or cable channels.
- Always lay signal cables in one channel, following the shortest route.
- Avoid extending the Profibus cables with connectors.
- Do not lay Profibus cables in bundles with telephone lines and cables leading to potentially explosive areas.
- Avoid branch lines.

Refer to the following cable specifications, connector description, and instructions for cable shielding and bus termination.

Profibus Cable Specifications

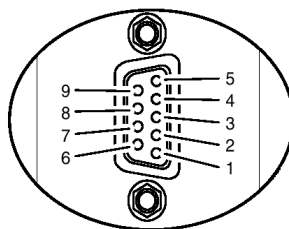
The proper cable for a Profibus network is a shielded twisted pair cable. Profibus cable is available from Siemens parts distributors and sold as "Profibus Network Cable". The twisted pair cable consists of a Green and a Red wire. Below are some of the cable characteristics of Profibus cable.

Profibus Network Cable	Siemens part # 6XV1-830
Profibus 9-pin Connector	Siemens part # 6ES7972
Impedance	135 to 165 Ohms (3 to 20 MHz)
Capacity	< 30 pF per meter
Resistance	< 110 Ohms per Kilometer
Wire Gauge	> 0.64 mm (0.025 inch)
Conductor Area	> 0.34 mm ² (AWG 22)

For data rates up to 500 kbits/second, follow the stub recommendations in the Profibus technical standard. At 1500 kbits/second the overall drop capacity should be less than 0.2nF. Maximum length of the stub at 1500 kbits/second is 6.6 meters.

The Profibus Cable Connector

Most Profibus devices, including the VersaPoint Network Interface Unit, provide the Profibus standard female 9-pin D subminiature connectors. Cable connectors are available from Siemens parts distributors as "Profibus 9-pin D connectors". These connectors provide termination resistors and a switch on the connector to enable/disable termination.



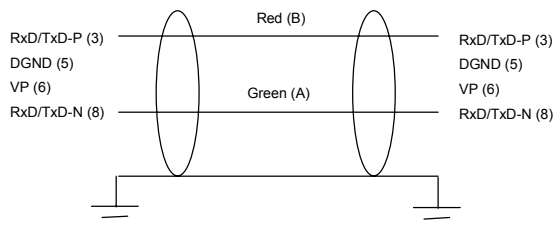
The connectors label the connections for the twisted pair as cable A and cable B. The following table illustrates the proper assignment of wire to connector to pin to signal.

Pin	Signal
1, 2, 7, 9	Reserved
3	RxD/TxD-P (receive/transmit data +), cable B
4	CNTR-P (control signal for repeater), direction control
5	DGND (reference potential up to 5V)
6	VP (supply voltage +5V for termination resistors)
8	RxD/TxD-N (receive/transmit data -), cable A

Shielding the Profibus Cable

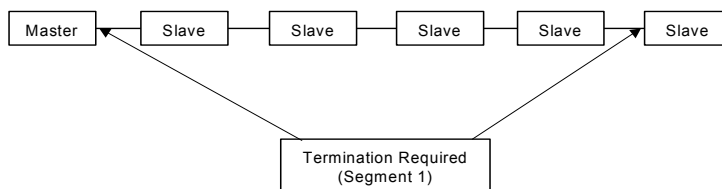
Cable shielding is recommended at higher baud rates. Cable shields must be attached at each device via the connector shells.

When mounting the NIU in the cabinet, connect the cable shield of the connected Profibus cable with a shield bus via cable clamps. Use an appropriate shield clamp for this.

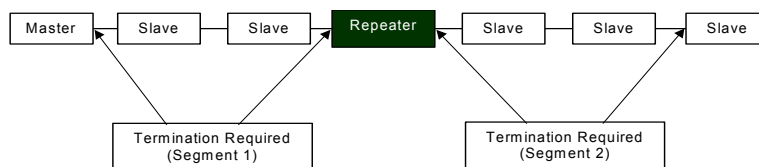


Bus Termination

Termination resistors are needed, as defined in DIN 19245 Part 1 section 3.1.2.5.

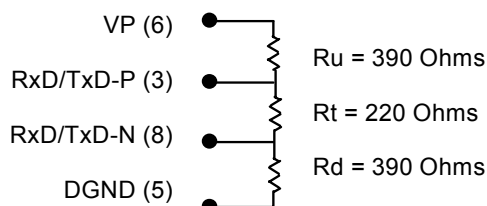


One terminator must be applied at each end of a network segment.

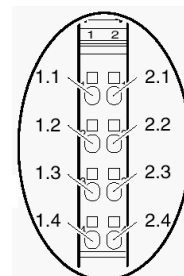
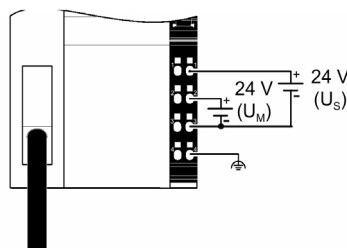


Generally, termination is provided in commercially-available Profibus standard network connectors. Some connector vendors provide termination capability in the connector and a switch on the connector to enable/disable termination. Some connector vendors provide both terminated and unterminated connectors.

Important: For proper network termination, it is essential that the terminating devices maintain power. Power is provided by the device on Pin 6 and Ground on Pin 5. If power is lost to either terminating device, the network may not operate correctly. Generally, the lone network master device is one of the terminating devices. Therefore, a loss of power to the network master renders the network inoperable anyway. The other terminating device may be a critical slave device which must maintain power or a separately powered, stand-alone terminator. These stand-alone devices are commercially available.



Connecting Power at the NIU



Terminal	Assignment
1.1, 2.1	Segment supply (+24VDC)
1.2, 2.2	Main supply, NIU supply, communications power and interface supply (+24VDC)
1.3, 2.3	Reference potential
1.4, 2.4	Functional earth ground (FE)

Providing the 24V Segment Supply (U_S) at the NIU

You can supply/generate the segment voltage at the NIU or a Power Terminal module. There are several ways of providing the segment voltage on the NIU:

1. You can provide the segment voltage separately on the terminal points 1.1/2.1 and 1.3/2.3 (GND) of the Power Terminal Strip.
2. You can jumper the connections 1.1/2.1 and 1.2/2.2 to ensure that the segment circuit is supplied from the main circuit.
3. With a switch between the terminal points 1.1/2.1 and 1.2/2.2 you can create a segment circuit (e.g., an emergency stop circuit).

CAUTION: To minimize heat generation, use both of the adjacent contacts to provide the main voltage and to provide/tap the segment voltage.

Fusing for Short Circuit Protection

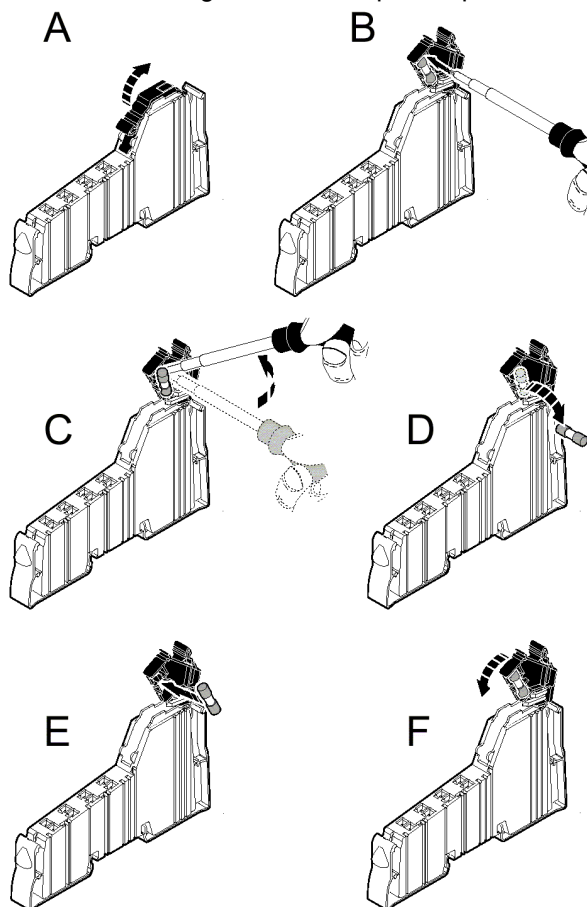
Both the segment supply U_S and the main supply U_M have the same reference potential. Therefore, an isolated voltage area on the I/O side cannot be created. Both the main supply and the segment supply are protected against polarity reversal and surge voltage.

CAUTION: The main supply and the segment supply integrated into the NIU do not have short circuit protection. The user must provide short circuit protection. The rating of the fuse must be such that the maximum permissible load current is not exceeded.

Replacing Power and Segment Terminal Fuses

For VersaPoint Power and Segment Terminal modules that have built-in fusing, if a fuse is not present or defective, you must insert or exchange the fuse. Follow the steps below to replace a fuse:

1. Lift the fuse lever (A).
2. Insert the screwdriver behind a metal contact of the fuse (B).
3. Carefully lift the metal contact of the fuse (C).
4. Carefully lift the fuse on one side and remove it by hand (D).
5. Insert a new fuse (E).
6. Push the fuse lever down again until it snaps into place with a click (F).



Connecting Sensors and Actuators

Each module-specific data sheet indicates the appropriate Terminal Strip(s) for that module.

Connecting Discrete Devices

VersaPoint discrete modules allow the connection of sensors and actuators in 2-wire, 3-wire, or 4-wire technology (ability varies by module). A single Terminal Strip can support the following connection methods:

- 2 sensors or actuators in 2-, 3-, or 4-wire technology
- 4 sensors or actuators in 2- or 3-wire technology
- 2 sensors or actuators in 2- or 3-wire technology with shielding (for analog sensors or actuators)

The tables below summarize the connection options for 24V modules. A connection example is given in every module-specific data sheet.

Connections for Discrete Input Modules

Connection	Abbreviation	2-Wire	3-Wire	4-Wire
Sensor signal I_N	IN	X	X	X
Sensor supply U_S / U_M	US (+24V)	X	X	X
Ground (GND)	GND ($\perp$)	–	X	X
Ground/FE shielding	FE	–	–	X

Connections for Discrete Output Modules

Connection	Abbreviation	2-Wire	3-Wire	4-Wire
Actuator signal OUT	OUT	X	X	X
Actuator supply U_S	U_S (+24V)	–	–	X
Ground (GND)	GND ($\perp$)	X	X	X
Ground/FE shielding	FE	–	X	X

X Used

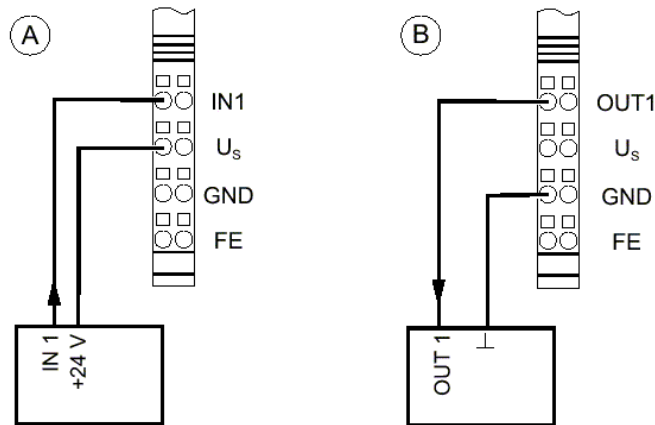
-- Not used

In the following figures U_S is the supply voltage. Depending on which voltage jumper is accessed, the main voltage U_M or the segment voltage U_S is the supply voltage.

Connecting 2-Wire Discrete Sensors and Actuators

Example A below shows the connection of a 2-wire sensor. The sensor signal is carried to the module point IN1. Sensor power is supplied through the voltage U_s .

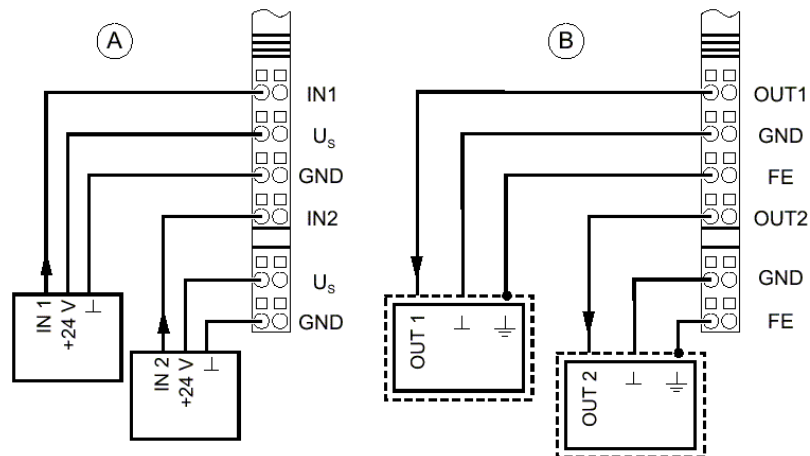
Example B below shows the connection of an actuator. The actuator power is supplied through output OUT1. The load is switched directly by the output. The maximum current carrying capacity of the output must not be exceeded.



Connecting 3-Wire Discrete Sensors and Actuators

Example A below shows the connection of a 3-wire sensor. The sensor signal is carried to the module point IN1 (IN2). The sensor is supplied with power using the module points U_s and GND.

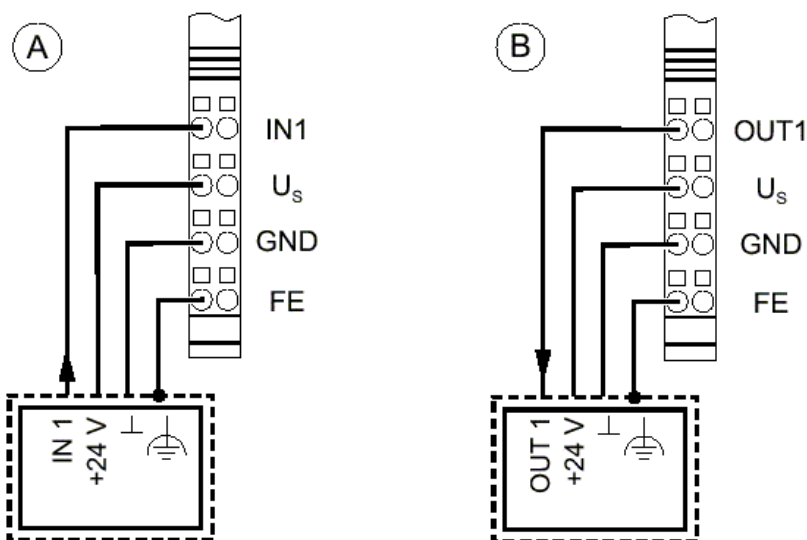
Example B below shows the connection of a shielded actuator. The actuator is supplied through output OUT1 (OUT2). The load is switched directly by the output. The maximum current carrying capacity of the output must not be exceeded.



Connecting 4-Wire Discrete Sensors and Actuators

Example A below shows the connection of a shielded 3-wire sensor. The sensor signal is carried to the module point IN1. The sensor is supplied with power using the module points U_s and GND. The sensor is grounded with the FE (Functional Earth Ground) module point.

Example B below shows the connection of a shielded actuator. By providing the supply voltage U_s , even actuators that require a separate 24V supply can be connected directly to the module. The maximum current carrying capacity of the output must not be exceeded.



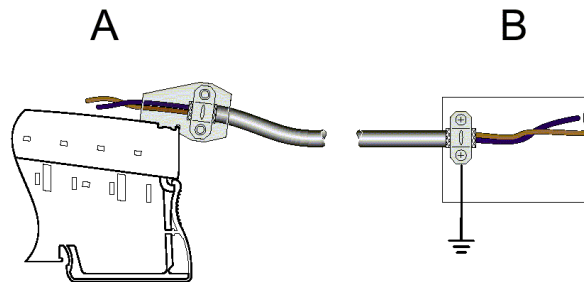
Connecting Analog Devices

Refer to the module datasheets for detailed instructions when connecting analog sensors and actuators. For maximum noise immunity, always use shielded, twisted-pair cables.

Connecting Field Devices to an Analog Input Module

For an analog input module:

- Within the module, grounding is connected with FE through an RC element
- For cable up to 10m (32.8 ft), connect the shield to the Shielded Terminal Strip as described previously.
- For cable longer than 10m (32.8 ft), connect the sensor directly to PE (protective earth ground) as shown below.



- When connecting the shield of the sensor with PE potential, ensure a large surface connection.

When using analog modules with more than one analog channel, there are different ways of connecting the shield. This depends on the wire diameter.

1. The preferred method for all wire diameters is to use a Terminal Strip with dual shield connectors (IC220TBK062).
2. Use a multi-wire cable for the connection of both sensors and connect the shield as described above to the shield connector (IC220TBK061).
3. Use a thin cable for the connection of each sensor and connect the shields of both cables together to the shield connector.

Connecting a Thermocouple Analog Input Module

1. Connect the shield to the shield connector.
2. Cut the braided shield off at the sensor or cover it with shrink tubing.

Connecting Field Devices to an Analog Output Module

For maximum noise immunity, always connect analog actuators with shielded, twisted-pair cables. For an analog output module:

- Connect the shield to the shield connector as described previously.
- When connecting the shield with FE potential, ensure a large surface connection.

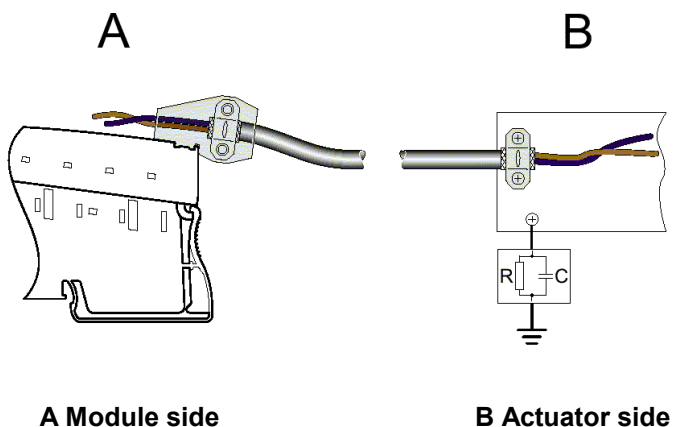
Danger of creating ground loops!

The shielding must be directly connected with ground potential at only one point.

For **cable lengths exceeding 10 meters (32.8 ft.)** the actuator side should always be isolated by means of an RC element.

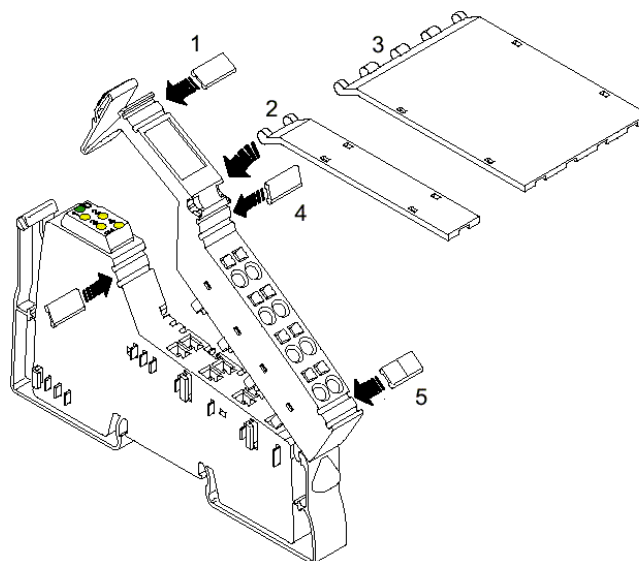
- The capacitor C should typically have values of 1nF to 15nF.
- The resistor R should be at least 10M Ω .

Connection of actuators for Signal Cables Longer than 10 Meters (32.8 Ft)



Module Labeling

You can identify the slots, terminal points, and connections using point labels and module labels.



Various options are available for labeling slots and module points:

1	Each Terminal Strip can be labeled individually with point labels (numbered labels: IC220ACC003 numbered 1-100, qty 10 sets, or blank labels: IC220ACC004, qty 1000).
2 / 3	Another option is to use module labels. These are available in two widths, to cover one Terminal Strip (IC220ACC001, qty.10) or four Terminal Strips (IC220ACC002, qty. 10).
	The Terminal Strip has a keyway for attaching a module label. A small latch holds the module label in place.
4 / 5	Each signal can be labeled individually using point labels. On an Extended Double Terminal Strip, the higher keyway (4) is designed for labeling signals 1/2 and the lower keyway (5) is for signals 3/4. (Numbered labels: IC220ACC003 numbered 1-100, qty 10 sets, or blank labels: IC220ACC004, qty 1000).

Chapter 5

Power for the Station

This section explains how power is utilized by the station and routed among the modules.

- Supply of the Profibus Network Interface Unit
 - The Logic Circuit
 - The Analog Circuit
 - The Main Circuit
 - Segment Circuit
 - Example of a Circuit Diagram
- Electrical Isolation
 - Electrical Isolation: Profibus
 - Electrical Isolation: I/O
 - Electrical Isolation: Discrete Modules
 - Electrical Isolation: Analog Modules
 - Electrical Isolation: Other
- Summary of I/O Module Current Consumptions
- Station Configuration Example

Supply of the Profibus-DP Network Interface Unit

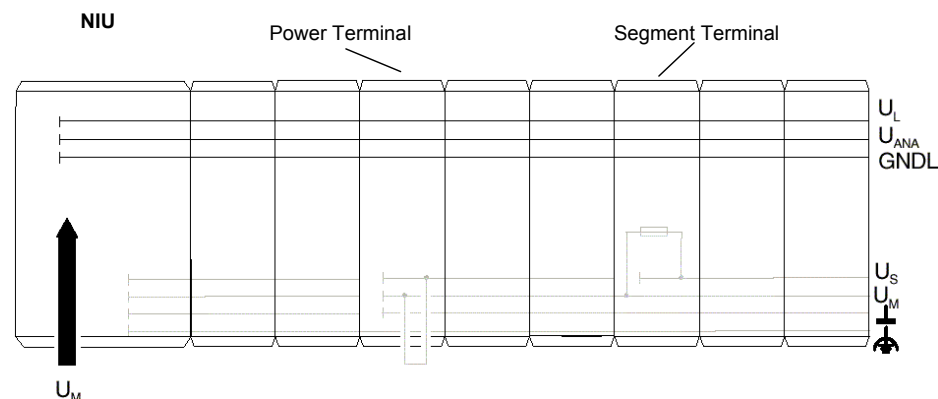
Logic and field power are distributed among VersaPoint I/O modules on several dedicated power circuits.

These are:

- The main power circuit (U_M), which powers all modules that do not need to be separately switchable from the main circuit. The main power circuit begins at the power terminal integrated into the NIU. It may also include additional Power Terminal modules as appropriate.
- The segment voltage (U_S) is drawn from the main power circuit at the NIU, at a Power Terminal module, or at a Segment Terminal module. A 24V segment circuit can be used to power I/O modules that must be separately switchable from the main voltage. One or more segment circuits might be created for discrete input modules without individual short-circuit protection, for discrete output modules, and to control power switches and contactors.
- Logic Voltage (U_L) is generated from the main power circuit at the NIU and provides communications power for all I/O modules in the station. This voltage is not augmented by the addition of extra power terminals.
- Analog Voltage (U_{ANA}) is supplied by the NIU and used to power the analog modules in the I/O Station. This voltage is not augmented by the addition of extra power terminals.

Each of these power circuits is described in this section.

The **main power** U_M and the **segment voltage** U_S for the station are connected at the Network Interface Unit. The main power generates internal voltages for the logic circuit U_L and analog signals U_{ANA} . The segment voltage supplies the sensors and actuators.



The Logic Circuit: U_L

The logic circuit with communications power U_L starts at the NIU. The logic circuit is fed through all modules of a station. The logic circuit cannot be supplied via another supply terminal.

<i>Function: Logic Circuit U_L</i>	Provides the communications power for all modules in the station.
<i>Voltage of U_L</i>	7.5V
<i>Generation of U_L</i>	U_L is generated from the main power U_M of the NIU.
<i>Current carrying capacity of U_L</i>	2A, maximum. (See Summary of I/O Module Current Consumptions at the end of this chapter). The communications power is not electrically isolated from the 24V input voltage for the NIU.

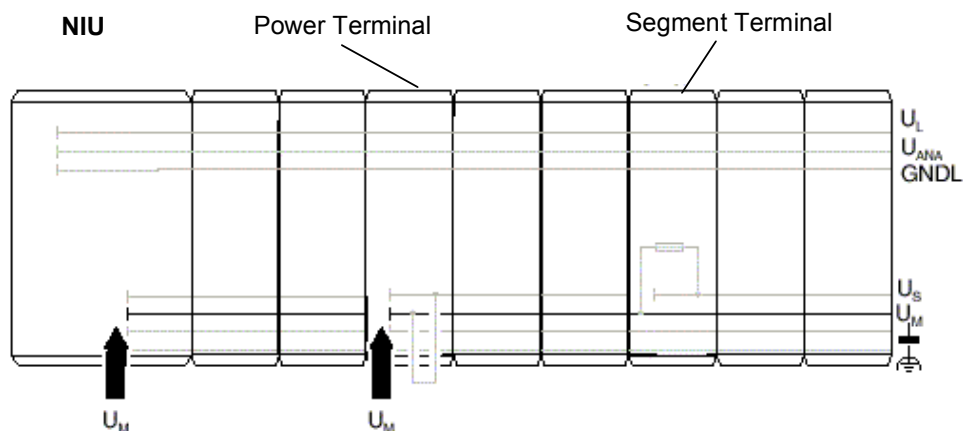
The Analog Circuit: U_{ANA}

Power for the analog modules (here also called analog voltage) U_{ANA} is supplied at the NIU. It is fed through all the modules in a VersaPoint station.

<i>Function: Analog Circuit U_{ANA}</i>	Provide power for analog modules
<i>Voltage of U_{ANA}</i>	24V.
<i>Generation of U_{ANA}</i>	U_{ANA} is generated from the main power U_M of the NIU.
<i>Current carrying capacity of U_{ANA}</i>	0.5A, maximum. (See Summary of I/O Module Current Consumptions at the end of this chapter).

The Main Circuit: U_M

The main circuit with the main power U_M starts at the NIU or a power terminal.



U_M is fed through all subsequent modules until it reaches the next power terminal. A new circuit that is electrically isolated from the previous one begins at the next power terminal.

Multiple power terminals can be used within one station.

Function of U_M

Several independent segments can be created within the main circuit. The main circuit provides the main power for these segments. For example, a separate supply for the actuators can be provided in this way.

Voltage of U_M

The voltage in this circuit must not exceed 250VAC.

Current carrying capacity of U_M

The current carrying capacity is 8A, maximum (total current with the segment circuit). If the limit value of the voltage jumpers U_M and U_S is reached (total current of U_S and U_M), a new power terminal must be used.

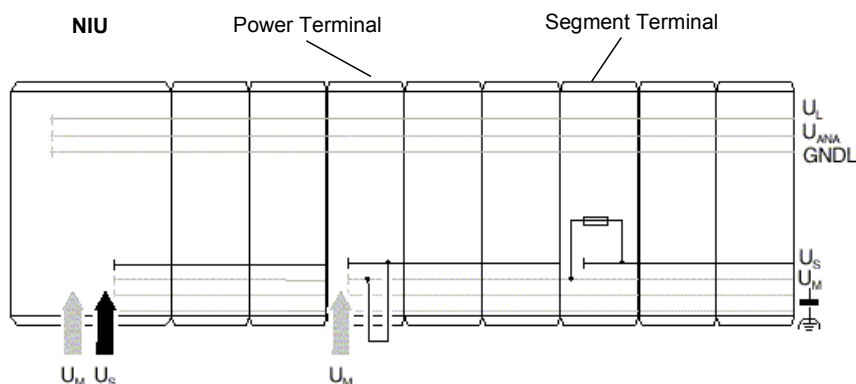
Generation of U_M

For many applications, the capacity of the U_M supply integrated into the Profibus NIU is sufficient to power the station. If necessary, U_M can also be supplied via a power terminal. A power terminal must be used if:

1. Different voltage ranges (e.g., 120 V) are needed
2. Electrical isolation is required.
3. The maximum current carrying capacity of a voltage jumper (U_M or U_S) is reached.

Segment Circuit: U_S

A segment circuit or auxiliary circuit with segment voltage U_S starts at the NIU or at a supply terminal (power terminal or segment terminal). It is fed through all subsequent modules as far as the next supply terminal.



Function of U_S

You can use several segment terminals within a main circuit, and therefore segment the main circuit. It has the same ground reference as the main circuit. This means that circuits with different fuses can be created within the station without external wiring.

Voltage of U_S

24VDC maximum.

Current carrying capacity of U_S

8A, maximum (total current with the main circuit). If the limit value of a voltage jumper U_M or U_S is reached (total current of U_S and U_M), a new power terminal must be used. (See summary of I/O module current consumptions in this chapter).

The segment circuit supplies all modules that need to be separately switchable from the main voltage e.g., on an emergency stop. This includes discrete input modules without individual short-circuit protection, discrete output modules, and auxiliary supply voltage for controlling power switches and contactors. The segment circuit can be switched off or fused using the emergency stop or segment terminals. It has the same ground reference as the main circuit. This means that emergency stop circuits or circuits with different fuses can be created within the station without external wiring.

Generation of U_S

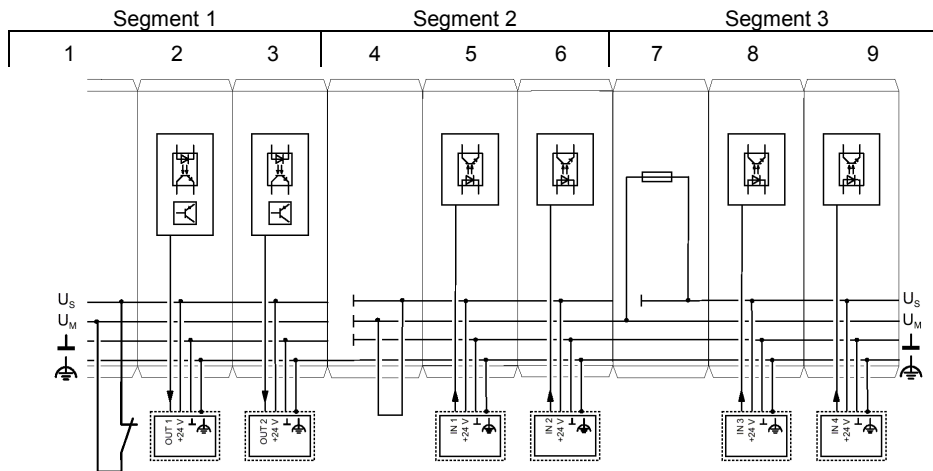
There are various ways of providing the segment voltage U_S :

1. You can supply the segment voltage at the NIU or at a power terminal.
2. You can tap the segment voltage from the main power at the NIU or a power terminal using a jumper or a switch.
3. You can use a segment terminal and tap the segment voltage from the main power.

With 120V and 230V voltage levels, segments cannot be created. In this case, only the main circuit is used.

Example of a Circuit Diagram

The diagram below shows part of a VersaPoint I/O Station.



Module	Type	Part Number	Max. Current Consumption of the Example Terminal from U_S
1	Network Interface Unit	IC220PBI001	
2	Discrete output module	IC220MDL753	4A
3	Discrete output module	IC220MDL721	4A
4	Power terminal	IC220PWR001	—
5	Discrete input module	IC220MDL643	2A
6	Discrete input module	IC220MDL642	1A
7	Fused Segment terminal	IC220PWR012	
8	Discrete input module	IC220MDL641	500mA
9	Discrete input module	IC220MDL641	500mA

Segment 1	The NIU supply and the main supply U_M are supplied at the NIU (1). The supply voltage of the logic U_L and the supply voltage of the analog modules U_{ANA} are generated from the NIU supply (U_L and U_{ANA} are not considered in the figure). Electrical isolation between logic and I/O is given through the separate supply of the NIU and U_M. The segment supply U_S for segment 1 is tapped from the main supply U_M. In this case, this happens through a switch located at the corresponding terminal points of the bus module. The digital output modules (2 and 3) are located in a switched segment circuit. As the two output modules consume a maximum of 8A, the main voltage U_M must be reinjected behind these two modules to prevent the current carrying capacity of the voltage jumpers from being exceeded.
Segment 2	The supply voltage U_M is reinjected at the power terminal (4). Using a jumper, the segment voltage U_S for segment 2 is tapped at this module from the main voltage U_M.
Segment 3	Segment 3 is created through a segment terminal with fuse (7). In a segment terminal with fuse the segment voltage is automatically tapped from the main voltage. This segment circuit is protected by an internal fuse. Because of this fuse the circuit is suitable for the connection of input terminals without internal fusing (8 and 9) or for the connection of output terminals (not present in this example).

Segment Circuits have the advantage of isolating errors

- In this example, a short circuit in input module 8 would not affect the modules of the first or second segment. Because of the fuse in segment terminal 7, only the third segment is switched off.
- If an error occurred in the system, the discrete output modules 2 and 3 could be switched on or off without affecting modules of other segments.

Electrical Isolation

The Profibus-DP NIU and the VersaPoint system have a defined voltage and grounding concept. This avoids an undesirable effect on I/O devices in the logic area, suppresses undesirable compensating currents and increases noise immunity.

Electrical Isolation: Profibus

The Profibus interface is electrically isolated from the station electronics. The shield of the Profibus cable is directly connected with the function earth ground spring (FE spring), which is located on the bottom of the NIU. This spring has no connection with the second FE spring in the module, which can also be found on the bottom of the NIU, directly under the terminal points. This spring is directly connected with both terminal points of the power connector. When the two functional earth ground springs have been snapped on, they have contact to the DIN rail and are used to lead off interference, rather than as a protective earth ground. To ensure discharge of interference, even for dirty DIN rails, connect the functional earth ground directly to terminal points 1.4 or 2.4. This also sufficiently grounds the I/O Station up to the first segment terminal.

To avoid the flow of compensating currents, which may affect data transmission quality, connect a suitably-sized equipotential bonding cable parallel to the Profibus cable.

Electrical Isolation: I/O

The NIU does not provide electrical isolation between the main circuit, U_M , and the VersaPoint module communications power. U_M (24V) is not electrically isolated from U_L (7.5V) or U_{ANA} (24V).

It is only possible to isolate both voltages separately using isolated power options for the main power U_M and the I/O voltage U_S on the NIU, because both voltages have the same ground reference.

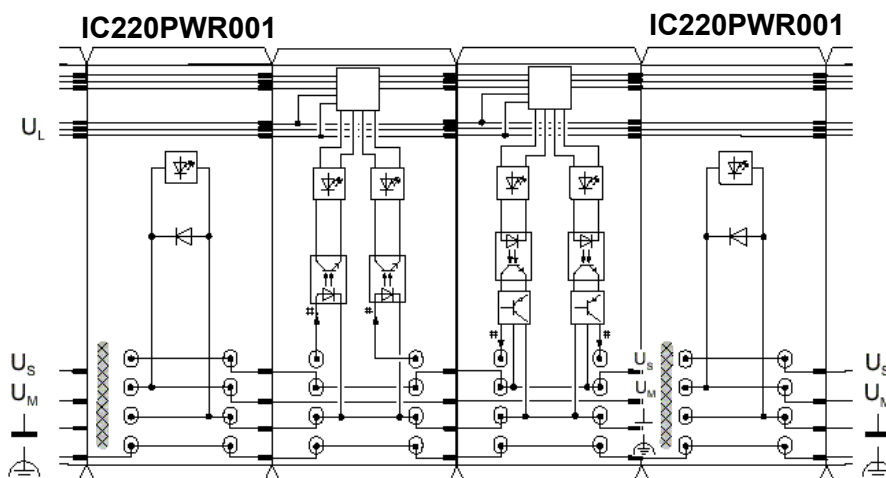
If isolation of these voltages is required, a separate power terminal with a separate isolated power supply must be used. Providing isolated power supplies for U_M and U_S on the same power terminal is insufficient as the two circuits share a ground.

Electrical Isolation: Discrete Modules

Isolation of the I/O circuit of a discrete module from the communications power is only ensured if a separate IC220PWR001 power terminal is used and the voltages for the power terminal and the NIU are provided by isolated power supply units. The 24V power supply units must not be connected to one another.

The power terminal interrupts all voltage jumpers from the previous terminal and creates the voltage jumpers for the main circuit U_M , the segment circuit U_S and reference potential of the supply voltage GND. An example of this is shown below.

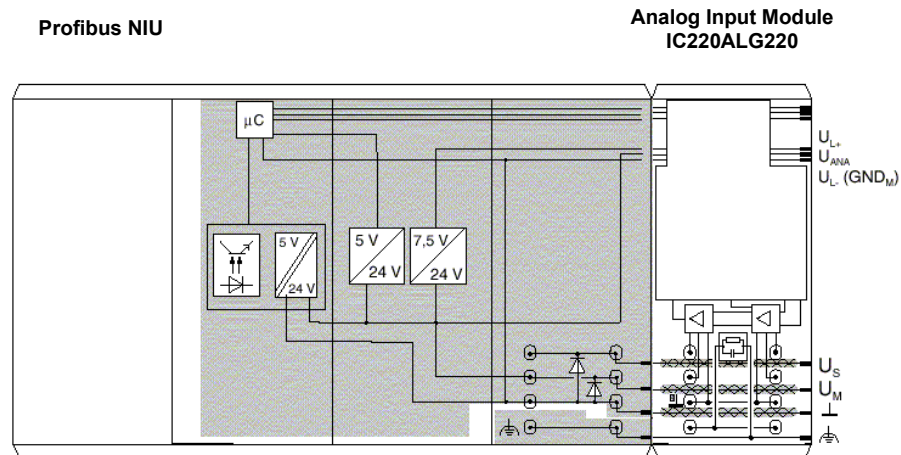
Example: Interruption/creation of the voltage jumpers with a power terminal



The areas hatched in the figure show the points at which the voltage jumpers are interrupted.

Electrical isolation: Analog module

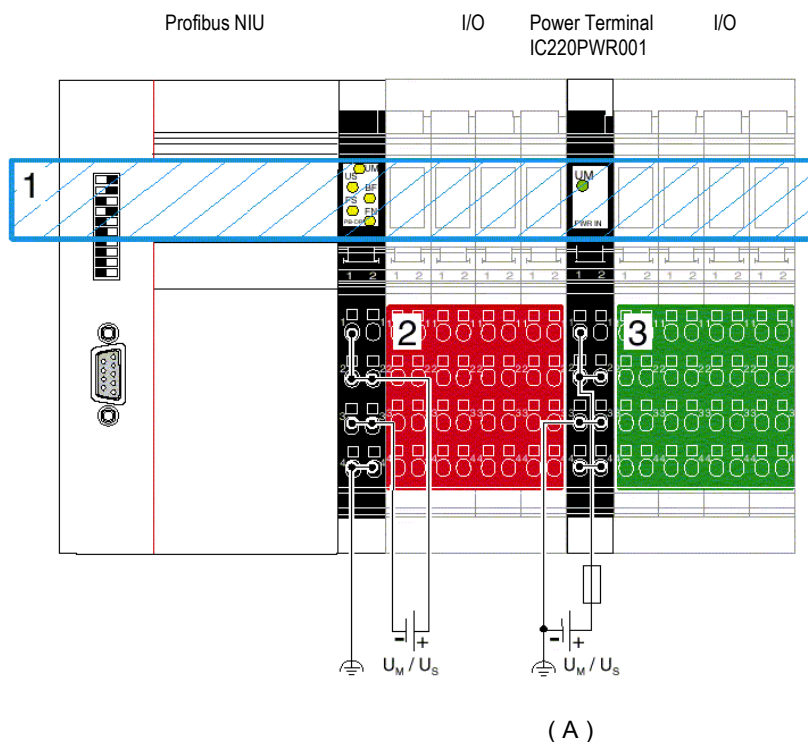
The I/O circuit of an analog module receives electrically isolated power from the 24V supply voltage U_{ANA} . The power supply unit with electrical isolation is a component of an analog module. The voltage U_{ANA} is carried through in each module and is available to the next module.



The voltage jumpers hatched **XXXX** in the figure are not used in the analog module. This means that the 24V supply of the NIU (U_M) or the power terminal are electrically isolated from the I/O circuit (measurement amplifier) of the analog module. The I/O circuit of the analog module is supplied by the analog circuit U_{ANA} .

Electrical isolation: Other

Other electrical isolation depends on how the supply voltages are provided. For instance, electrical isolation can be provided by inserting a new 24V supply using a power terminal. During this process the 24V power supply units must not be connected to one another. One method of electrical isolation using a power terminal is illustrated below. Connection between the ground of a supply voltage (U_S or U_M) and functional earth ground should only be made at one point within the station (point A). If a number of grounds are connected to the functional earth ground, the electrical isolation is lost.



Electrically isolated areas within the station:

- 1 Bus logic of the station
- 2 Isolated I/O
- 3 Isolated I/O

VersaPoint Power Consumption Example

When configuring a VersaPoint Station it is important to consider the current requirements of each module in the I/O system. These current requirements are described in the module-specific data sheets. As noted previously:

- If the current load limit is reached at U_S or U_M a new Power Terminal must be inserted
- If the current load limit is reached for U_L or U_{ANA} a new VersaPoint station must be built using a new Network Interface Unit.

The following example shows how the current consumptions of a VersaPoint I/O station can be determined. It also provides insight into the requirement for additional I/O terminals.

Consider an application which requires the following VersaPoint modules:

Catalog Number	Description
IC220MDL721(Qty 3)	Output, 24VDC Positive Logic, 2.0A, 2 Points
IC220MDL751	Output, 24VDC Positive Logic, 0.5A, 2 Points
IC220MDL752	Output, 24VDC Positive Logic, 0.5A, 4 Points
IC220MDL641(Qty 2)	Input, 24VDC Positive Logic, 2 Points
IC220MDL644	Input, 24VDC Positive Logic, 8 Points
IC220ALG620	Analog In, 15 Bit RTD, 2 Channel
IC220PWR014	Segment Terminal with Electronic Fuse

Using the information on current consumption in the module datasheets, the following current consumption table can be generated:

Module	No.	Current Consumption of				
		U_L (module)	U_L (total)	U_{ANA}	U_S (module)	U_S (total)
IC220MDL644	1	50mA	50mA		2A	2A
IC220MDL641	2	35mA	70mA		500mA	1A
IC220PWR014	1	30mA	30mA			
IC220MDL752	1	40mA	40mA		2A	2A
IC220MDL751	1	33mA	33mA		1A	1A
IC220MDL721	2	35mA	70mA		4A	8A
IC220MDL721	1	35mA	35mA		1.2A	1.2A
IC220ALG620	1	43mA	43mA	11mA		
Current Load			371mA	11mA		15.2A
Permissible current consumption of the voltage jumper			2A	0.5A		8A

The current requirements for U_L and U_{ANA} are within the supply capability of the Profibus NIU. The current requirement of U_S exceeds the supply capability of the NIU, so additional power terminals must be used. The number of additional power terminals to be used depends on the arrangement of the modules.

As discussed in chapter 4, the recommended sequence of the modules in this example is:

IC220PBI002	IC220MDL721	IC220MDL721	IC220MDL721	IC220MDL752	IC220MDL751	IC220PWR014	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M :		4A	1.2A	4A	2A	1A		2A	0.5A	0.5A
		5.2A		4A	2A	1A		3A		

If this arrangement must be maintained, two additional power terminals are needed:

IC220PBI002	IC220MDL721	IC220MDL721	IC220PWR001	IC220MDL721	IC220MDL752	IC220MDL751	IC220PWR001	IC220PWR014	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M :		4A	1.2A		4A	2A	1A		2A	0.5A	0.5A	
		5.2A			7A				3A			

If a system design goal is to use as few terminals as possible, the module sequence must be changed. In this case, only one additional power terminal would be needed:

IC220PBI002	IC220MDL721	IC220MDL721	IC220MDL752	IC220PWR001	IC220MDL721	IC220MDL751	IC220PWR014	IC220MDL643	IC220MDL641	IC220MDL641	IC220ALG620
U_S/U_M :		4A	1.2A	2A		4A	1A		2A	0.5A	0.5A
		7.2A				8A					

Please note that while the I/O modules must be rearranged in order to minimize the number of power terminals required, the recommended module sequence is preserved downstream of each power terminal.

Chapter 6

Diagnostics

This chapter describes in detail the indications of the NIU and module LEDs, as well as additional diagnostics features of the VersaPoint station.

- Local diagnostics
 - Profibus NIU
 - VersaPoint modules
 - Local diagnostics example
- Diagnostics available on the Profibus Master
 - Profibus Standard Diagnostics
 - Device Specific Diagnostics

Errors can occur during startup of the VersaPoint station as well as during operation. There are basically two ways of detecting errors. One way errors can be detected is by using local diagnostics with the help of the Profibus NIU LEDs and those on the VersaPoint I/O modules. Alternatively, all types of errors can be sent from the Profibus NIU to the Profibus master via the Profibus diagnostic telegram so that errors can also be diagnosed and corrected using software in the controller.

Local Diagnostics

Diagnostics information is provided by LEDs on the Profibus NIU and the modules attached to it. In general, the I/O Station is operating correctly if all diagnostic LEDs are constantly lit and green. If any LEDs are red or blinking, refer to the diagnostics information below.

LEDS on the Network Interface Unit

The diagnostic LEDs on the NIU indicate the type and location of the error. The NIU is functioning correctly if all of the green LEDs are on. Once errors have been removed, the indicators immediately display the current status.



NIU LED	Color	Meaning
UM	Green	Supply voltage in the main circuit for the NIU, communications power and interfaces present.
US	Green	24 V segment circuit supply present
BF	Red	No communication on Profibus
FS	Red	Defines the function of the FN LED: FS ON: FN indicates the type of error. FS OFF: FN indicates the error number
FN	Red	The number of flashing pulses indicates the type of error or the error number, depending on whether FS is on or not

Possible LED combinations

No.	UM	US	BF	FS	FN	Error	Remedy
1)	○	○	○	○	○	Voltage supply U _M and U _S absent	Check voltage supply U _M and U _S
2)	○	●	○	○	○	Voltage supply U _M absent	Check voltage supply U _M
3)	●	○	○	○	○	Voltage supply U _S absent	Check voltage supply U _S
4)	●	●	○	○	○	No error, everything OK	
5)	●	●	●	○	○	No communication on Profibus	▪ Correct Profibus address on the NIU ▪ Correct Profibus master settings ▪ Remove Profibus cable fault
6)	●	●	○	●	◉	Number of pulses on FN indicates the type of error	See the table that follows.
7)	●	●	○	○	◉	Number of pulses on FN indicates the error number	See the table that follows.
8)	●	●	◉	○	○	Outputting failsafe values (IC670PBI002 only)	Switch master to Run state, check communication with master. Set "data exchange mode" parameter on the NIU to "data exchange without operate"

Key: ○ LED OFF ◉ LED flashing ● LED ON

Determining the Error Cause and Remedy from the NIU LEDs

The type of error and the error number can be determined using the **FS** and **FN** LEDs on the NIU.

- FS ON: the number of flashing pulses on FN indicates the type of error.
- FS OFF: the number of flashing pulses on FN indicates the error number.

This information can be used to determine the type of error from the following table.

Example: FS is on, the FN LED flashes three times simultaneously. The FS LED goes out and the FN LED flashes four times. The error is caused by the use of a module type that is not permitted.

Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
1	Parameter Error on Profibus (SET_PRM telegram)		
	The Parameter Error Numbers listed for Error Type 1 below refer to NIU model IC670PBI002 only. For IC670PBI001, Error Type 1 indicates that an error has occurred during configuration of the NIU. Check the configuration.		
	1	An invalid module number was used. (IC670PBI002)	Check whether the module can be parameterized.
	2	A parameter block is not complete.	The number of modules does not correspond to the parameter blocks.
	3	The data length of the parameter block is too short.	Check the number of parameters.
	4	The data length of the parameter block is too long.	Check the number of parameters.
	5	The internal block for configuration, failsafe values, and PCP is too small.	Check the structure of the parameters for the modules.
	6	The header byte for the module parameter is incorrect.	Check the first byte of the module parameters.
	7	PCP initialization for a module without PCP functions.	Check the configuration.
	8	Too many data blocks for the module.	The number of modules does not correspond to the parameter blocks.
	9	Incomplete data block in a deactivated module.	Check the number of parameters.

Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
2	Configuration Errors on Profibus (CHK_CFG telegram)		
	1	Not all VersaPoint modules that are present have been configured.	Add extra modules to the configuration.
	2	More VersaPoint modules have been configured than are present.	Remove the extra modules from your configuration or add the missing modules.
	3	The first byte of the special identification format for the VersaPoint module is faulty.	Determine the exact error location, using the device-specific diagnostics in your control system.
	4	Not enough bytes of the special identification format for the last VersaPoint module have been configured	Check the identification format.
	5	The sum of the configured process data for inputs and outputs of the VersaPoint station is greater than 184 bytes.	Determine the exact error location using the device-specific diagnostics in your control system. Combine several VersaPoint modules in the configuration, so that the process data is compressed (resulting in fewer empty bits).

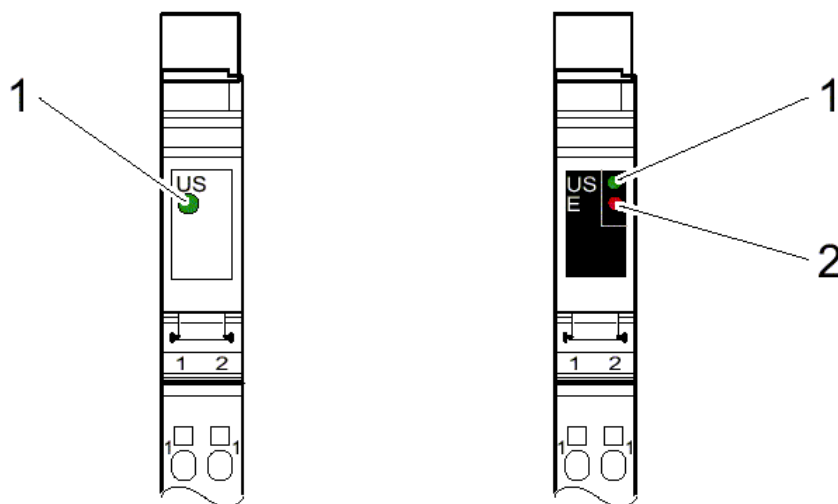
Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
2	<i>Configuration Errors on Profibus (CHK_CFG telegram) continued</i>		
	6	The ID code of the configured VersaPoint module does not correspond with the ID code of the module in the station.	Determine the exact error location using the device-specific diagnostics in your control system.
	7	The length code of the configured VersaPoint module does not correspond to the length code of the module in the station.	Determine the exact error location using the device-specific diagnostics in your control system.
	8	The amount of manufacturer-specific data of the special identification format for the -VersaPoint module is faulty. The amount must be 2, 3 or a multiple of 2.	Determine the exact error location using the device-specific diagnostics in your control system.
	9	Not enough output process data has been configured within the identification format for the VersaPoint module.	Determine the exact error location using the device-specific diagnostics in your control system.
	10	Not enough input process data has been configured within the identification format for the VersaPoint module.	Determine the exact error location using the device-specific diagnostics in your control system.
	For Error Type 2, Error numbers above 10 are for NIU model IC670PBI002 only.		
	11	More than 244 bytes are required for Profibus configuration.	
	12	An internal list is too short.	
	13	Not enough output bytes have been configured for deactivated modules.	Determine the exact error location using the device-specific diagnostics of the control system.
	14	Not enough input bytes have been configured for deactivated modules.	Determine the exact error location using the device-specific diagnostics of the control system.

Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
3	Configuration Errors in the VersaPoint Station		
	1	The VersaPoint module is not enabled for operation on the NIU.	Determine the exact error location using the device-specific diagnostics in your control system. Remove the module from the station.
	2	The length code of the VersaPoint module corresponds to a length of 0 bytes.	Determine the exact error location using the device-specific diagnostics in your control system. Check the module and, if necessary, remove it from your configuration.
	3	The length code of the VersaPoint module corresponds to a length of more than 32 bytes.	Determine the exact error location using the device-specific diagnostics in your control system. Remove the module from the station.
	4	Invalid module type present in the station.	Determine the exact error location using the device-specific diagnostics in your control system. Remove the module from the station.
	5	The sum of the process data for the local bus is greater than 250 bytes.	Check the amount of process data and reduce the number of modules in the station.
	6	There are more than 64 VersaPoint modules connected.	Check whether more than 64 VersaPoint are present in the station and reduce the number of modules.
	7	The sum of the process data for the Profibus inputs and outputs is greater than 176 bytes (184 bytes in DP/V0 mode).	Remove the modules from the station.
	8	More than 8 PCP slaves are connected. (IC670PBI002)	Reduce the number of PCP modules in the station

Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
4	Errors Within the Station		
	1	An error has occurred during data transmission between the VersaPoint modules (data IN).	Determine the exact error location locally using the LEDs or the device-specific diagnostics in your control system. Check the connection between the devices indicated.
	2	An error has occurred during data transmission between the VersaPoint modules (data OUT).	Determine the exact error location locally the LEDs on the I/O modules, or the device-specific diagnostics in your control system. Check the connection between the device indicated.
	3	An error has occurred during data transmission between the VersaPoint modules.	The exact error location can be detected locally using the flashing LEDs on the I/O modules. Check the connection preceding the indicated devices.
	4	The VersaPoint module is not ready.	Determine the exact error location using the device-specific diagnostics in your control system. Check the indicated devices.
	5	The replaced VersaPoint module does not correspond to the length code or ID code.	A new VersaPoint module does not correspond to the NIU configuration. Determine the exact error location using the device-specific diagnostics in your control system. Remove the module from the station.
	6	An additional VersaPoint module has been detected in the station.	Check the configuration of the station. If the configuration is correct, switch off the current supply for a short period, so that the new configuration is accepted.

Error Type (FS on, # of FN pulses)	Error No. (FS off, # of FN pulses)	Meaning	Remedy
5	Module Errors		
	1	An error has occurred in your I/O circuit (e.g., short-circuit or overload at the actuator).	The station and the VersaPoint module where the I/O error has occurred can be located using the Profibus address and the device number. The error location can also be detected at the flashing LED of the VersaPoint module, or using the device-specific diagnostics in your control system. Using the module data sheet, check which error this error message can trigger. Remove the error from your I/O devices.
	2	Module is not ready. (IC670PBI002 only)	Determine the exact location using the device-specific diagnostics of the control system. Check the device.
	Backplane Errors (IC670PBI002)		
6	1	General parameter error	
7	Memory Access Errors (IC670PBI002)		
	1	Memory not available.	
	2	Checksum error	
	3	Read error	
	4	Write error	
	5	Initialization	
	6	Saved structure differs from the actual structure.	

Power and Segment Module LEDs



On Power and Segment Modules with fusing, the green LED indicates that the main or segment voltage is present. In the case of fused modules (illustration right above), the green LED indicates the main voltage is present at the line side of the fuse. If the red LED is also on, there is no voltage on the load side of the fuse.

Power Module LEDs

US (1)	Green LED	Supply voltage in the main circuit
	ON:	Supply voltage present in the main circuit
	OFF:	Supply voltage not present in the main circuit
E (2)	Red LED	On fused modules: fuse status
	ON:	Fuse not present or blown
	OFF:	Fuse OK

Segment Module LEDs

US (1)	Green LED	Supply voltage in segment circuit
	ON:	Supply voltage present in segment circuit
	OFF:	Supply voltage not present in segment circuit
E (2)	Red LED	On fused modules: fuse status
	ON:	Fuse not present or blown
	OFF:	Fuse OK

I/O Module LEDs

I/O modules have both diagnostic (1) and status (2) LEDs. All input/output module LEDs are electrically located in the logic area.



Diagnostics LEDs on I/O Modules

The diagnostic indicators (red/green) indicate the status of the modules. A module is operating normally if its diagnostic LED (D) is on and green. If an error is detected, the LEDs immediately display the current status.

D (1)	Green LED	Diagnostics
	ON:	Station is active
	Flashing:	
	0.5 Hz: (slow)	Communications power present, backplane not active
	2 Hz: (medium)	Communications power present, backplane active, I/O error
	4 Hz: (fast)	Communications power present Backplane communications has failed with the module or between the module and the preceding module.
	OFF:	Communications power not present, backplane not active

Status LEDs on I/O Modules

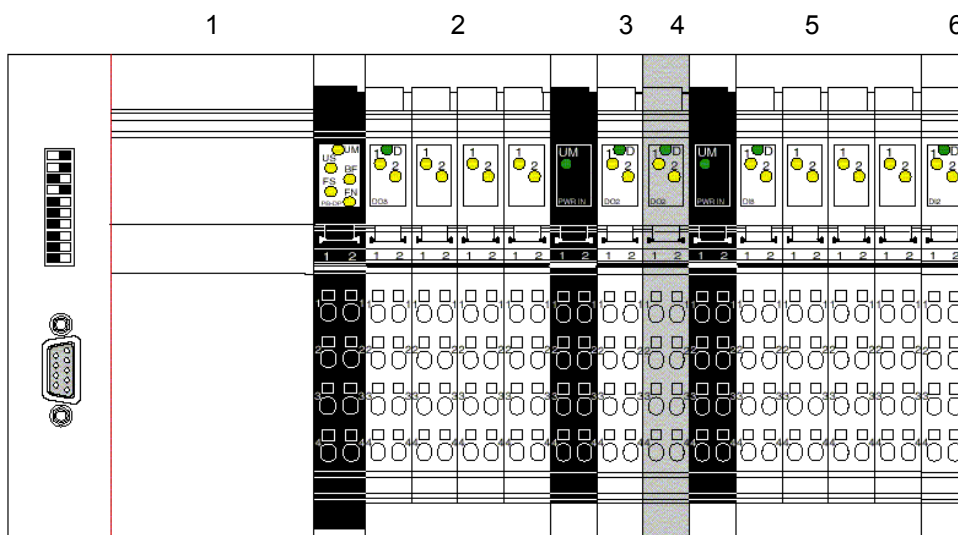
The status indicators (yellow) display the status of the relevant inputs/outputs.

1, 2, 3, 4 (2)	Yellow LED	Status of the input/output
	ON:	Associated input/output ON
	OFF:	Associated input/output OFF

Local Diagnostics Example

The following example provides an indication of how the module LEDs of a VersaPoint station will react in the presence of different types of errors. Two specific errors are shown, an I/O error and a backplane error.

Example Station for Error Identification

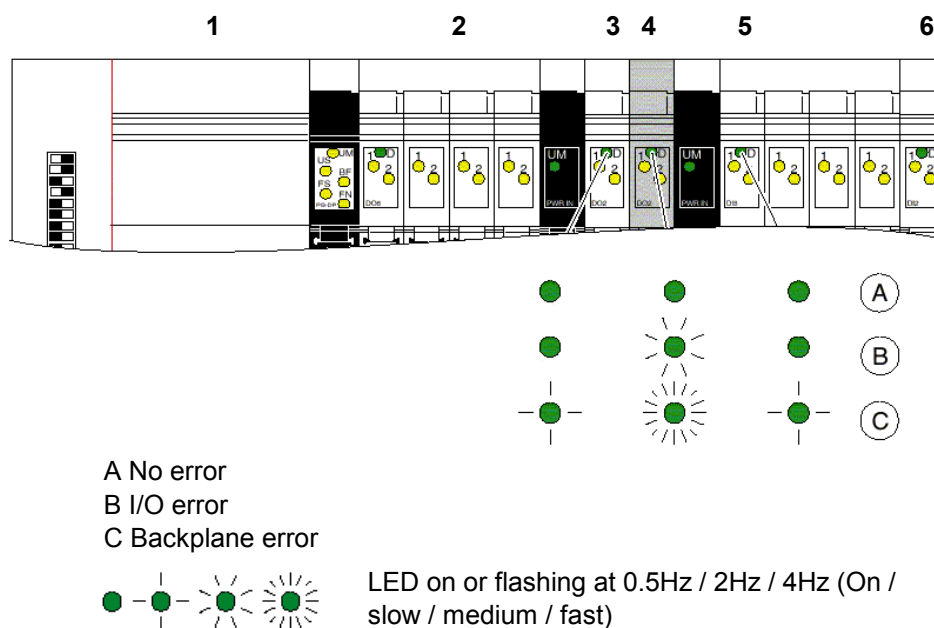


Modules used in the example station:

1	IC220PBI001	4	IC220MDL751
2	IC200MDL753	5	IC220MDL643
3	IC220MDL751	6	IC220MDL641

In this illustration, the power modules are not numbered because they do not include diagnostics and therefore report no data to the NIU. If modules including diagnostics had been selected these modules would report data to the NIU and would be numbered.

The example below shows error states. Either errors have been detected on module 5 or module 4 has broken down. The illustration below shows the behavior of the diagnostic indicators on the adjacent modules.



I/O Error

Error:	Short circuit on module 4 (IC220MDL751)
Effect:	
Control system:	Error message to the control system (I/O error)
NIU:	FS and FN flash
Module 4:	Green D LED flashes at 2Hz
Other modules:	Remain unchanged

Backplane Error

Error:	Incoming bus after module 2 and before module 4 has been interrupted
Effect:	
Control system:	Error can be located by the control system
NIU:	FS and FN flash
Module 4:	Green D LED flashes at 4Hz (bus error)
Other modules:	Green D LEDs on all other modules flash at 0.5Hz

Diagnostics on the Profibus Master

The error information sent in the diagnostic telegram from the Network Interface Unit to the Profibus master can be displayed using the control system's specific diagnostic tools.

These are "standard diagnostics" and "device-specific diagnostics". The meaning of the data reported in this telegram is given in this section.

Profibus Standard Diagnostics

Byte	<i>Meaning with DIP switch 8 set to off</i>	<i>Meaning with DIP switch 8 set to On</i>
0	Station status 1	
1	Station status 2	
2	Station status 3	
3	Profibus master address	
4	00 _H manufacturer identification high byte	06 _H manufacturer identification high byte
5	F0 _H manufacturer identification low byte	CC _H manufacturer identification low byte

Detailed Explanation for Station Status 1 to 3

Station status 1 to 3 indicates the state of a DP slave.

Structure of station status 1 (byte 0)

Bit	Value	Meaning, Cause	Remedy
0	1	The DP slave is not addressed by the DP master	Is the correct Profibus address set on the DP slave? Is the bus connector connected? Is there voltage to the DP slave? Is the RS-485 repeater set correctly? Has the DP slave been reset?
1	1	The DP slave is not ready for data exchange	Wait, because the DP slave is starting up
2	1	The configuration data sent from the DP master to the DP slave does not correspond to the configuration of the DP slave.	Has the correct station type or the correct DP slave configuration been entered in the configuration software?
3	1	An external diagnostic is present (group diagnostic indicator)	Evaluate the identification-specific diagnostics, the module status and/or the channel-specific diagnostics. Once all errors have been removed, bit 3 is reset. The bit is reset when a new diagnostic message is present in the bytes of the above diagnostics.
4	1	The required function is not supported by the DP slave.	Check configuration
5	1	The DP master cannot interpret the reply of the DP slave	Check bus configuration
6	1	The DP slave type does not correspond with the software configuration	Is the correct station type specified in the configuration software?
7	1	The DP slave has been parameterized by another DP master (not by the DP master that currently has access to the DP slave)	Bit always has the value 1, if, for example, you access the DP slave with the PG or another DP master. The Profibus address of the DP master that parameterized the DP slave is located in the diagnostic byte "master Profibus address".

Structure of station status 2 (byte 1)

Bit	Value	Meaning
0	1	The DP slave must be parameterized again.
1	1	A diagnostic error message has been generated. The DP slave will not operate until the error has been removed (static diagnostic message).
2	1	The bit always has the value 1 if the DP slave with this Profibus address is present.
3	1	Response monitoring is activated for this DP slave.
4	1	The DP slave has received the "FREEZE" control command. This bit is only updated if you change another diagnostic message too.
5	1	The DP slave has received the "SYNC" control command.
6	0	Bit always has the value 0.
7	1	The DP slave is deactivated, i.e., removed from the current process

Structure of station status 3 (byte 2)

Bit	Value	Meaning
0 to 6	0	Always 0.
7	1	There are more error messages than the DP slave can save.

Profibus – Device-Specific Diagnostics (For NIU Model IC670PBI002)

Byte	Meaning	Explanation
0-5	Profibus standard diagnostics	
0	Station status 1	
1	Station status 2	
2	Station status 3	
3	Profibus master address	
4	00 _H manufacturer identification high byte	06 _H manufacturer identification high byte
5	F0 _H manufacturer identification low byte	CC _H manufacturer identification low byte
6	09 H header byte	Number of device-specific diagnostic bytes
7	81 H	Diagnostics version
8	Device Number	Slot
9	Specifier	0 = No change 1 = Error present 2 = Error no longer present
10	Error type	0 = No error 1 = Profibus Parameter Error (SetPrm) 2 = Profibus Configuration Error (Chk_Cfg) 3 = Other configuration error 4 = Error within the I/O Station 5 = Module error 6 = Parameter error in the I/O Station For information about error type, see “Determining the Error Cause and Remedy” earlier in this chapter.
11	Error number	0 to 12. Depends on error type. For information about error number, see “Determining the Error Cause and Remedy” earlier in this chapter.
12	ID Code	0 to 255
13	Status Length Code	0 to 255
14	41H	Software version

Profibus – Device-Specific Diagnostics (For NIU Model IC670PBI001)

Byte	Meaning	Explanation
0-5	Profibus standard diagnostics	
6	0A H header byte	Number of device-specific diagnostic bytes
7	00 H	Diagnostics version
8	Firmware revision	This contains the firmware version in ASCII code. Example: 0x45 corresponds to revision "E".
9	Error type	For information about error type, see "Determining the Error Cause and Remedy" earlier in this chapter.
10	Error number	For information about error number, see "Determining the Error Cause and Remedy" earlier in this chapter.
11	Device number of the VersaPoint module before the error location	This byte contains the logical number of the VersaPoint module in the station in which an error has occurred: the first module is the module immediately to the right of the NIU. Passive devices such as power modules without diagnostics do not count as devices
12	Device number of the VersaPoint module after the error location	This byte contains the logical number of the VersaPoint module in the station (see #11 above)
13	VersaPoint module ID code	The ID code of the VersaPoint module is used for identification and is marked on the housing and printed in the module data sheet.
14	VersaPoint module length code	The length code is used for identification and for automatic setting of the data width. This is also printed in the module data sheet.
15	Reserved	

Module Diagnostics, NIU Model IC670PBI002

Byte No.	Value	Description
Bytes 0 to 5		PROFIBUS standard diagnostics
Byte 6	49 _{hex}	Header
Byte 7	0 to 255	Module 1 to 8
Byte 8	0 to 255	Module 9 to 16
Byte 9	0 to 255	Module 17 to 24
Byte 10	0 to 255	Module 25 to 32
Byte 11	0 to 255	Module 33 to 40
Byte 12	0 to 255	Module 41 to 48
Byte 13	0 to 255	Module 49 to 56
Byte 14	0 to 255	Module 57 to 64

Bytes 2 to 9:

A bit is reserved for each module.

If the bit is set, there is an error at the module.

Byte 0 Bit 0: Module 1

Byte 0 Bit 1: Module 2

- : -

Byte 0 Bit 7: Module 8

Byte 1 Bit 0: Module 9 etc.

Chapter *7*

Configuration

This section describes the configuration options of the VersaPoint Profibus NIU.

- Powerup Autoconfiguration
- Configuration of the Profibus Master
- Example Configuration
- Dynamic Configuration

Powerup Autoconfiguration of the NIU

The NIU's baud rate and I/O module map are automatically set when the NIU powers up.

On powerup the Profibus NIU identifies the baud rate setting of the Profibus master and automatically adjusts to match. The NIU can communicate at network speeds of 9.6kbps to 12mbps.

The NIU also identifies the modules attached to it during powerup. If modules are added or removed (not recommended with station power applied) the change will not be reflected in the NIU's configuration until a station power cycle is executed – it will be reflected by the NIU's diagnostics LED's (see Chapter 6). It is important to note that once this configuration change is made, the Profibus master configuration must also be changed. Failure to do so will result in loss of communications.

Configuration of the Profibus Master

Profibus-DP is normally a single master system. This master is typically a communications card installed in a Programmable Logic Controller, industrial PC, or other controller (Drive, Computer Numerical Control, etc.). In each case these masters require configuration information for the attached Profibus Slaves to be input. This configuration is typically accomplished using a configuration tool specifically designed for the Profibus master. . An example of configuring the VersaPoint Profibus NIU with a Series 90-30 PLC Profibus Master CPU follows in this chapter. Please consult the information available with your Profibus Master for more information.

The GSD File

Every Profibus slave device certified by the Profibus Trade Organization is required to define a GSD file (electronic device data sheet).

The GSD file is a text file filled with keywords and values that together define the specific characteristics, features, and limitations of the slave device. For the Profibus NIU, the GSD file also lists the Profibus configuration identifiers for all currently-supported VersaPoint I/O modules. The GSD file also includes the text strings to properly decode the diagnostic information provided by the NIU.

Please refer to appendix D for an example GSD file for the Profibus NIU.

Configuring the Profibus Master

The Profibus NIU and the modules in the I/O Station must be included in the configuration of the Profibus Master. The exact configuration steps will depend on the type of master being configured, and the features that will be used in the application.

As an example, this section shows the steps to include a VersaPoint Profibus NIU in the configuration of a Series 90-30 PLC CPU model IC693CPU366. Refer to the User Manual for the Profibus Master for more information and instructions.

The basic configuration steps for the master are:

1. Configuring the Profibus parameters of the CPU. These include:
 - a. Assigning memory references to status bits for all of the slaves on the Profibus network. The Profibus NIU will be one of these slaves.
 - b. Assigning a memory area to contain the ID of any slave that reports diagnostic data. During system operation, the master can monitor

this location. When a slave reports diagnostic data, the application program can read it using a Get Device Diagnostics COMMREQ

- c. Assigning memory references for the optional SyncFreeze output bits that the master can use to synchronize groups of remote I/O stations.
 - d. Assigning memory references that will be used to store the station address of any slave that has sent a DPV1 alarm message. The application program can monitor this area and obtain the alarm information from the module using a DPV1 Alarm Acknowledge COMMREQ.
 - e. Choosing the Network Settings for the Profibus network. The VersaPoint Profibus NIU will read these settings at powerup.
 - f. Establishing the Inputs Defaults for each slave, in case communications between the master and slave are lost.
 - g. Setting up whether or not to report slave communications events in the Fault Table.
2. Adding the Profibus NIU as a slave in the master configuration.
 3. Configuring the Modules in the I/O Station.
 - a. Selecting modules in the same sequence as they occupy in the I/O Station.
 - b. For each module, configuring memory references for its input/output data.
 - c. If appropriate, configuring swap bytes for the module data, as described.
 4. Configuring the DP-V1 settings of the Profibus NIU, if it will be used in DPV1 mode.

Configuring Profibus Parameters for the Profibus Master CPU

The Profibus parameters configure the operation of the embedded Profibus master of the CPU366.

Slave Status Bit Array Address	Starting address for the consumed range used to receive the slave status bits. Select a non-overlapping range in %AI, %I, %Q, %G, %AQ, %R, %T, or %M. A slave's status address equals Start Address + Station Address of the slave. For example, if the status bits are mapped to %I00001, the status for the slave at Station Address 5 would be found at %I00001 + 5=%I00006. The master's status is located in the same way as the slaves' (Start Address + Station Address). The master is configured as station 0 by default, but can be set to any valid address (0-125). For discrete memory, the length of the Slave Status Bit Array Address is 128 bits. For word-type memory, Length is 8 words.						
Slave Diagnostics/ Firmware ID Address	Starting address for the Slave Diagnostic/Firmware ID. Select a non-overlapping range in %AI, %I, %Q, %G, %AQ, %R, %T, or %M. For discrete memory, the length is 32 bits. For word-type memory, Length is 2 words. ■ The first word is used by the Profibus master to contain the station address of any slave that has reported diagnostic data. If diagnostics are pending, the master places the address of the first slave that has diagnostics into this word. The diagnostics can be read using the Get Device Diagnostics COMMREQ (task 4). This clears the word and the master then places the next pending diagnostic address into the Slave Diagnostics word. If the word is zero there are no pending diagnostics. ■ The second word contains the current firmware version running on the master module. The Major Revision number resides in the upper byte and the Minor Revision number resides in the lower byte of this word.						
Sync/Freeze Control Bits Address	Starting address of a 16-bit (1-word) produced range used for the Sync/Freeze command data. Select a non-overlapping range in %AI, %I, %Q, %G, %AQ, %R, %T, or %M. Defaults to %Q memory. Sync and Freeze are global control functions that can be used to synchronize groups of remote I/O stations. A slave such as the Profibus NIU can be in one or more of 8 groups. ▪ When the slaves in a group receive a Sync command, they hold outputs at their last states until the master sends another sync command. ▪ When the slaves in a group receive a Freeze command, they freeze inputs until the master sends another Freeze command. During system operation, the application can write a group number to the LSB of the memory location configured here, and one of the following commands to the MSB: <table border="0"> <tr> <td>UNFREEZE = 0x04</td> <td>FREEZE = 0x08</td> </tr> <tr> <td>UNSYNC = 0x10</td> <td>SYNC = 0x20</td> </tr> <tr> <td>TRIGGER = 0x80</td> <td></td> </tr> </table>	UNFREEZE = 0x04	FREEZE = 0x08	UNSYNC = 0x10	SYNC = 0x20	TRIGGER = 0x80	
UNFREEZE = 0x04	FREEZE = 0x08						
UNSYNC = 0x10	SYNC = 0x20						
TRIGGER = 0x80							

DPV1 Status	Starting address of a 32-bit (2-word) produced range used to receive the station address of a slave that has sent a DPV1 Alarm message. If another slave sends a DPV1 Alarm message, it is ignored until the first one has been serviced, and will then appear in a subsequent scan. To acknowledge the DPV1 Alarm message and obtain the alarm information it contains, the application program can use a DPV1 Alarm Acknowledge (task 9) COMMREQ. The DPV1 Acknowledge block must be a non-overlapping range in %AI, %I, %Q, %G, %AQ, %R, %T, or %M. Defaults to %AI memory.
Network Settings	Network Settings for the CPU366 Profibus master are summarized below.
Inputs on Loss of Slave	Determines the values that the master reports for an individual slave if communications between master and slave are lost. Choices are Hold Last State (default) and Clear.
Slave Status Fault Table Entries	If set to True (default), slave communications status events (loss and re-establish) are reported as fault table entries. If set to False, slave status events are not reported to the fault table.
Download Names/ Descriptions	If set to True, names and descriptions for the slaves and the master are sent to the PLC and do not revert to default upon uploading. If set to False, the names and descriptions are not downloaded to the PLC and revert to the default values upon uploading from the PLC.
Download GSD Files	Determines whether a <i>Full Upload</i> or <i>Generic Upload</i> can be performed from the downloaded configuration. If set to False (default), GSD files are not downloaded to the PLC. Subsequent upload operations are Generic. If set to True, the GSD files required by the network configuration are sent to the PLC. Subsequent upload operations are Full uploads.

Network Settings for the Profibus Master

Name	The name assigned to the Profibus master..
Station	The address of the Profibus master on a Profibus DP network. The master is configured as Station 0 by default. Each device on a network must have a unique address.
Description	An optional description for the Profibus master.
Master Type	The type of Profibus master (read only).
Device ID	The ID of the Profibus master (read only).
Resources - Used	The number of bytes used by the Profibus master.
Resources - Available	The number of bytes available for use by the Profibus master. The maximum size is 16384 bytes (read only).
Baud rate	The baud rate of the network. The choices are 9.6 Kbps, 19.2 Kbps, 93.75 Kbps, 187.5 Kbps, 500 Kbps, 1.5 MBps, 3 MBps, 6 MBps, 12 MBps. Default is 1.5 MBps.

Highest Station	The highest possible station address for any active station on the network. This affects how much time is spent soliciting for new Profibus master devices. Default is 126.
Token Rotation Time	The maximum target token rotation time for the network, expressed in t_bits (and milliseconds).
Slot	The amount of time (microseconds) the master waits for a reply to a message.
Idle 1	The amount of time (microseconds) the master waits after it receives a reply or an acknowledgement.
Idle 2	The amount of time (microseconds) the master waits after sending a message and before sending another message.
Ready	The number of t_bits the master waits before sending an ACK response, after sending a command.
Quiet	The number of t_bits the master waits after it turns on its transmitter, before it begins to send data.
Token Retry	The number of times the master tries to pass the token before deciding that a station is not there.
Token Error	The maximum number of errors in 256 token cycles.
Response Error	The maximum number of message failures in 16 successive messages.
Gap Update Factor	The number of token rotations between solicitations for a new Profibus master
Message Retry	The maximum number of times the master tries to send a message when the slot time expires.
Typical	Scan Cycle Times , The estimated time (μ s) required for one scan of the PROFIBUS network (read-only).
Minimum	The minimum I/O scan time in 100 microsecond increments. This may be required if the I/O modules are restricted in how often they can be scanned. Range is 2 to 65535.
Auto	If this is selected, the maximum I/O scan time and Watchdog timer are assigned automatically based on the number of slave devices configured.
Maximum	If Auto is not selected, select the maximum I/O scan time in 10 millisecond increments. If the scan time exceeds this value, the master faults all the slaves, reinitializes them, and brings them back online. When the maximum I/O scan time is updated, the Watchdog timer is also updated. Range is 12 to 65535.
Watchdog	If Auto is not selected select the watchdog timeout value. If a slave does not receive any communication from its master within the Watchdog time, the slave generates a fault, the outputs are set to 0, and the slave is reinitialized by the master. Assigning a value affects the maximum cycle time.
Repeater	Select this if there are repeaters on the network.
FMS Devices	Select this if there are Profibus FMS devices on the network.
Stay Offline on Error	Select this if you want the master to stay offline when the Token Error Limit or response Error Limit is exceeded within 256 token cycles.

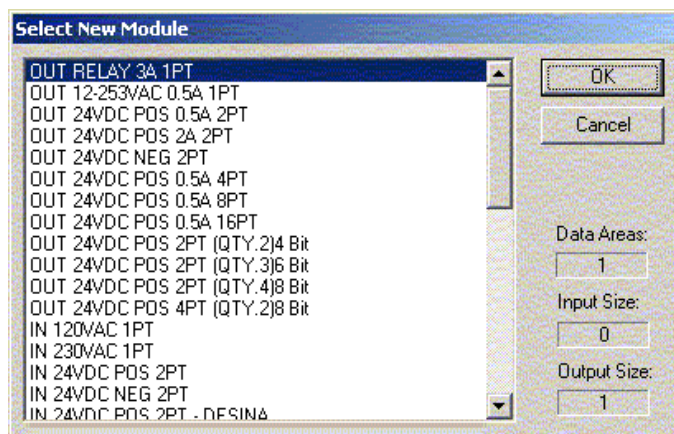
Adding the Profibus NIU to the IC693CPU366 Master Configuration

1. In the Navigator window, right click the Master (IC693CPU366 for this example), and choose Add Slave. The Slave Catalog dialog box appears.
2. Select the VersaPoint NIU and click OK. This adds the VersaPoint NIU to the Master configuration. The Slave Properties dialog box opens.

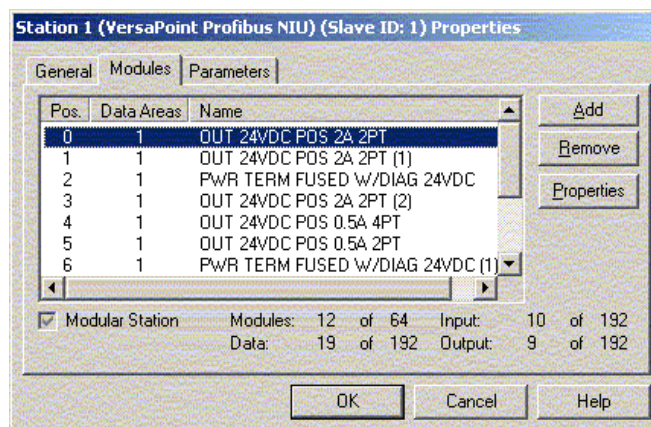
Name	The name assigned to the slave. You can edit the name or use the default name.
Station	The address of the slave on a PROFIBUS DP network. The slave is defaulted to the next highest available address.
Description	An optional description for the slave device. The Inspector displays a maximum of 254 characters. However, more than 254 characters can be entered in the dialog box.
Vendor	The manufacturer of the slave device, from the GSD file. This is a read-only field
Device ID	The ID of the PROFIBUS device. This is a read-only field.
Model	The model of the slave device. This is a read-only field.
Hardware Rev.	The hardware revision of the device, from the GSD file. This is a read-only field.
Class	The class of the slave device. This is a read-only field.
Software Rev.	The software revision of the device, from the GSD file. This is a read-only field.

Configuring the Modules in the I/O Station

After adding the Profibus NIU to the configuration for the Master, add the modules in the I/O Station, in the same sequence they occupy in the hardware installation. Select the Modules tab and click Add. The Select New Module dialog box appears.

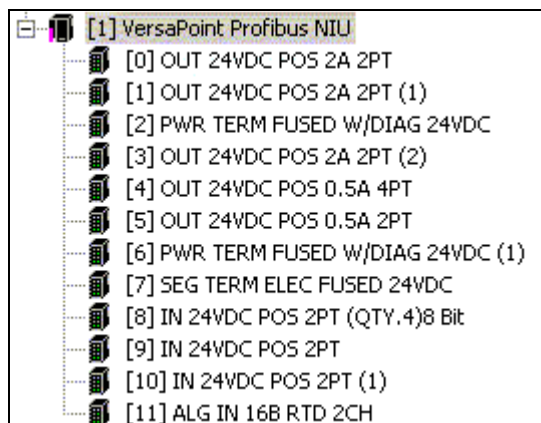


Select a module and click OK. The module is added to the Modules list in the slave Properties dialog box. Add additional modules as required for your system.



To change the order (position) of a module, select it and click Properties. The module Properties dialog box opens. Enter the numerical value of the new position the module is to have. The position numbering starts at 0.

After adding all the modules in the I/O Station, click OK. The modules appear under the slave node in the Hardware Configuration.



Configuring Module Data Areas

Configuring the modules' data areas assigns to each module in the VersaPoint I/O Station the appropriate types of memory references for its input and/or output data. To configure each module's data areas, right click the module node in the Hardware Configuration, and choose Configure. The Parameter Editor window for the module appears. For example:

Data Areas				
Area	Type	Ref Address	Length	Swap Bytes
1	Analog In	%AI0007	2	False
1	Analog Out	%AQ0001	2	False

Default addresses appear, but can be edited if required.

The individual I/O module datasheets give more information about their data formats.

Data Area Parameters

Area	This value is an index beginning at 1. Read-only.
Type	Specifies whether the data is input or output as well as type, digital or analog. Value can be Digital In, Analog In, Digital Out, or Analog Out.
Ref Address	Specifies the memory area that is used to map the data area. Regardless of the reference type used, input areas are considered as consumed and cannot overlap, while output areas are considered as produced and may overlap. Allowable Ranges: %AI, %AQ, %I, %Q, %G, %R, %T, %M. If the number of bytes is odd, analog memories are not allowed and selections are limited to: %I, %Q, %G, %M
Length	Specifies the length of the reference. Includes the entire data area by default. If set to 0, the data area is not mapped. For discrete memories, the allowable range is [0, 8, 16, ..., X] For analog memories, the allowable range is [0, 1, 2, ..., X]
Swap Bytes	The swap bytes field is used to manipulate the byte order. Because Profibus devices often do not follow the standard, the ability to change byte ordering is provided. The analog areas travel in MSB and should be swapped if LSB is required. The effect of swapping bytes is shown on the next page. ▪ If Type is Digital and the module has an odd number of bytes, Swap Bytes is set to False (no swapping) and read-only. ▪ If Type is Digital and the module has an even number of bytes, default is set to False. Setting Swap Bytes to True causes the LSB and MSB to be swapped before the data is mapped into PLC memory. ▪ If Type is Analog, default is set to False. Setting Swap Bytes to True causes the LSB and MSB to be swapped before the data is mapped into PLC memory.

Byte Rotation for 16-Point Discrete Modules

Default Format	Byte 0								Byte 1							
Rotated Format	Byte 1								Byte 0							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Slot	4				3				2				1			
Module point	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1

Byte Rotation for 32-Point Discrete Modules

By default channels 1 - 8 (slot.x) are on byte n+3 and channels 9 - 16 (slot 2.x) are on byte n+2, channels 17 - 24 (slot 3.x) are on byte n+1, and channels 25 - 32 (slot 4.x) are on byte n.

If the format is rotated, points 1- 8 (slot 1.x) are on byte n, points 9 - 16 (slot 2.x) are on byte n+1, points 17 - 24 (slot 3.x) are on byte n+2, and points 25 - 32 (slot 4.x) are on byte n+3.

Byte	Byte 0					Byte 1					Byte 2					Byte 3				
Bit	7	6	...	1	0	7	6	...	1	0	7	6	...	1	0	7	6	...	1	0
Default, Slot	4					3					2					1				
Default, Module Point	8.4	7.4	...	8.1	7.1	6.4	5.4	...	6.1	5.1	4.4	3.4	...	4.1	3.1	2.4	1.4	...	2.1	1.1
Rotated, Slot	1					2					3					4				
Rotated Module Point	2.4	1.4	...	2.1	1.1	4.4	3.4	...	4.1	3.1	6.4	5.4	...	6.1	5.1	8.4	7.4	...	8.1	7.1

Configuring DP-V1 Settings for the Profibus NIU

1. In the Properties window, click the button in the DPV1 Settings field. The PROFIBUS DPV1 Setup dialog box appears.

PROFIBUS DPV1 Setup Parameters

The default values in this dialog box are from the NIU's GSD file.

Enable DPV1 Support

Check this box to enable DPV1 settings for the Profibus NIU.

Clear this check box to disable DPV1 settings. The values of all parameters are retained until the DPV1 settings are enabled again for the selected device.

Maximum Channel Data Length

The maximum length in bytes of the DPV1 telegrams. Valid range: 4 through 244 bytes.

Maximum Alarm PDU Length

The maximum length in bytes of the DPV1-Alarm telegrams.

Diagnostic Update Delay

The maximum number of extra diagnostic cycles the master will wait to obtain the release for a DATA_EXCHANGE. If the Diagnostic Update Delay is set to 0, the master waits for one diagnostic cycle before reporting an error. If the Diagnostic Update Delay is set to 15, the master waits for 16 diagnostic cycles before reporting an error. The master waits for one diagnosis cycle more than the value of the Diagnostic Update Delay.

Valid range: 0 through 15.

Maximum Active Alarms

The maximum number of possible active alarms.

Choices:

- 1 alarm of each type
- 2, 4, 8, 12, 16, 24 or 32 alarms in total

Slave Functions***Extra Alarm Service Access Point***

The service access point (SAP) through which the master quits alarms.

Choices:

- Master Alarmacknowledge SAP51: Master quits alarms via SAP51.
- Master Alarmacknowledge SAP50: Master quits alarms via SAP50.

Configuration Data Convention

The DPV1 data types.

Choices:

- Configuration Data of EN 5017
- Configuration Data of DPV1

Enabled Alarms**Pull Plug Alarm**

When checked, a slot signals the withdrawal of a module or the insertion of a module.

Process Alarm

When checked, a process alarm signals the occurrence of an event in the connected process.

Diagnostic Alarm

When checked, a diagnostic alarm signals an event within a slot.

Manufacturer Alarm

When checked, device-specific alarms are enabled.

Status Alarm

When checked, a status alarm signals a change in the state (such as run, stop, or ready) of a module.

Update Alarm

When checked, an update alarm signals the change of a parameter in a slot, for example, by a local operation or remote access.

Dynamic Configuration

Dynamic configuration is the specification and configuration of a maximum configuration. Any subgroup of this maximum configuration can be operated.

In addition to dynamic configuration, empty spaces in the I/O Station can be reserved for future expansion.

Empty spaces that have been reserved can be used at different configuration levels. Configuring the maximum configuration level reserves memory in the PLC. The optional modules must not be connected. They can be deactivated in the configuration.

If the I/O Station is subsequently expanded to include previously-deactivated modules, the new modules can be connected and activated in the hardware configuration.

Indexes

In dynamic configuration, a maximum I/O Station is specified during configuration, reserving extra addresses in the PLC. Any subgroup of this maximum configuration can be operated. The advantage is that several I/O Stations with the same device number but different configurations can be used in the field, although only one such station can ever be active on Profibus.

Profibus NIU PBI002 uses three “indexes” for information about the modules in the VersaPoint I/O Station.

Index 6: Activation/deactivation of terminals and slots Access: Read and write

This data is stored during a loss of power.

Length = 8 bytes

Byte 1								Byte 2								Bytes 3 ... 7	Byte 8							
8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9	...	x	63	62	61	60	59	58	57

Bit = 1: Module and slot inactive

Bit = 0: Module and slot active

Index 7: Read back active/inactive terminals and slots

Access: Read

Index 7 indicates which modules are active/inactive. Deactivation via the parameter telegram (reservation of empty spaces) is also indicated here.

Index 7 is also 8 bytes in length, and uses the same format as Index 6, shown above.

Bit = 1: Module and slot inactive

Bit = 0: Module and slot active

Empty spaces configured in the parameter telegram are logically ORed with inactivation via index 6.

Index 8: Read/write ID Access: Read and write

Length = 2 bytes

Each Profibus NIU, PBI002, can be assigned an individual ID. This ID is stored retentively and can be used to identify a station if it was disconnected from the power supply. This means that several stations can be operated alternately under the same station address in Profibus. The ID can also be read cyclically in the process data.

Accessing the Indexes via Process Data

Access to the indexes described on the previous pages can be enabled via Profibus-DP/V1 or by DP/V0. This means that the indexes can also be addressed via normal process data. This example describes access via process data.

To access indexes 6 to 8 via process data, configure the "PD-PCP x words" terminal (x = 4, 6, ..., 16) as the first terminal in the station. The data width and address can be selected according to the options in the CPU.

The "Module ID" is used to read the individually-definable ID of the Profibus-DP-V1 NIU (index 8). It does not have to not be configured. However, if it is configured, it must be placed either directly after "PD-PCP x words" in the second position, or in the first position if no "PD-PCP x words" module was configured.

Configure the remaining modules as usual.

Options for Specifying the Active Configuration

In the following example, two 16-channel digital modules and one 1-channel analog output module should not be part of the I/O Station. The modules are part of the maximum configuration, but should be deactivated at this I/O Station. An entirely different subgroup of the maximum configuration could thus be active at another station. This means that I/O Stations with different subgroups can be docked on Profibus and run with their individual configurations.

There are three options for startup:

- Via DP/V1
This option is only available for PBI002, and for hosts that support DP/V1.
- Via DP/V0 with maximum configuration and configured empty spaces
Empty spaces remain free. The active configuration can be modified via DP/V0 and the deactivation can then be undone from the configuration. Proceed as follows:
 1. Deactivate the I/O modules in the hardware configuration and download the hardware configuration.
 2. In the hardware configuration select only the "PD-PCP x words" module and download it. The actual connected structure is of no importance here (at least one module must be connected).
 3. Switch to cyclic data exchange and retentively set the configuration connected to the station via index 6.
 4. Enter configuration settings in the hardware configuration.
- The third option is particularly suitable for startup. All the hardware can be plugged in together. You only need to transmit the hardware configuration once on startup if "PD-PCP x words" is the only module configured. Briefly switch to RUN state and transmit the data for index 6 and 8. The module can be clearly identified later by assigning an ID to index 8.

The configuration for the maximum configuration can then be completed.

Specifying the Active Configuration

1. Specify the address on the station using DIP switches 1 to 7 and select the operating mode using DIP switch 8 = ON.

Connect the modules that represent the subgroup of the maximum configuration. In the hardware configurator, configure only the "PD-PCP x words" module (recommendation: $x \geq 8$).

The address can be freely defined in the PLC memory within the framework of the options provided by the PLC. The module has no specific requirements.

2. Specify the active configuration.

In the example, the modules in slots 3, 4, and 6 should be deactivated. According to the description of index 6, the value is 2C 00 00 00 00 00 00 00.

Write request (master -> slave)

Data (8 Words VC1)	Data Structure
04 00 00 06 00 08 2C 00 00 00 00 00 00 00 00 00 00	Write/Slot/Index high/Index low/Subindex/Length/Data 2 bytes unused

Write response (slave -> master)

Data (8 Words VC1)	Data Structure
84 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Write response/Status 14 bytes unused

Clear request (master -> slave)

Data (8 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (8 Words VC1)	Data Structure
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Clear response

Specify an ID

Two bytes are available for an ID, so there are 65,536 retentive module IDs. If modules with the same Profibus address are connected alternately, this makes it easy to identify modules after power up.

The ID is stored on index 8.

Example ID: 2633

Write request (master -> slave)

Data (8 Words VC1)	Data Structure
04 00 00 08 00 02 26 33 00 00 00 00 00 00 00 00	Write/Slot/Index high/Index low/Subindex/Length/Data 8 bytes unused

Write response (slave -> master)

Data (8 Words VC1)	Data Structure
84 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Write response/Status 14 bytes unused

Clear request (master -> slave)

Data (8 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (8 Words VC1)	Data Structure
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	Clear response

Chapter 8

Communications

This chapter describes acyclic communications for module IC220PBI002 in DP/V1 mode.

- Types of Acyclic Communication
- PCP Communication Basics
- Acyclic Communication in DP/V1 Mode
- PCP Communication Via Process Data (Class 1 Master in DP/V0 Mode)
- Format of the Parameter Telegram
- Error Codes for DP/V1 and VC1 Communication

These features are not available with module IC220PBI001, with module IC220PBI002 in V0 mode, or with some control systems.

- DP/V1 expands the cyclic data exchange function according to IEC 61158 to include acyclic services. This makes it easy to operate even complex devices.
- Peripherals Communication Protocol (PCP) is used in the I/O Station to exchange data acyclically. Usually, this is the configuration data for complex modules such as VersaPoint RS-232 and VersaPoint RS-485/422 modules.

DP/V1 is a Profibus mechanism that corresponds to PCP. The Profibus NIU prepares the data records, which are sent via DP/V1 from the Class 1 or Class 2 master, for the PCP mechanism in the I/O Station. PCP data from the backplane is then converted into DP/V1 telegrams.

If the control system or configuration program does not support DP/V1, it is possible to use the functions provided by the cyclic process data channel (DP/V0) as described later in this chapter.

Types of Acyclic Communication

Acyclic Communication Via the Class 1 Master

The Class 1 master carries out parameterization during slave startup. It is also the master for cyclic data traffic.

The Class 1 master can also control an RS-232 interface acyclically, or read a parameter from the RS-232 device.

Corresponding read and write accesses are defined for the Class 1 master. Because it already has a connection to the slave during cyclic data traffic, the Class 1 master does not have to establish an explicit connection (using "Initiate"), but can communicate with the slave directly via "Read" and "Write".

Before programming the application, check whether the control system or configuration tool supports DP/V1. If not, you can use the functions offered by the cyclic process data channel (DP/V0).

Acyclic Communication Via the Class 2 Master

For communication in the Class 2 master, the data fields are identical to those of Class 1 communication. For Class 2, only the Service Access Points (SAP) are different. Class 2 requires the use of "Initiate" and "Abort" to establish and release the connection via SAP49 and 50. If DP/V1 devices are already in use, the routines for connection management can be adapted easily.

The Class 2 master can be implemented in various forms, such as a display device or operator interface. In a display device, the data is fetched from the slave on request if, for example, a specific parameter is to be read. Access to the operator interface is usually acyclic.

Only one active DP/V1 communication is permitted at any time. It is possible to connect a total of up to eight PCP-compatible modules to the Profibus DP/V1NIU.

PCP Communication Basics

The NIU can use PCP (Peripherals Communication Protocol) to exchange parameter data in a local bus, with certain intelligent modules, such as the RS-485/422 Communications Module (IC220BEM485) and the RS-232 communications module (IC220BEM232).

Device Parameter Data

Device parameters are data that is provided to intelligent PCP devices during the startup phase of machines and systems. Once the parameters are entered, the data only has to be modified upon a change in the parameterization or in the event of an error. The parameters are described in the individual module documentation. Device-specific parameters for all PCP devices can be modified via the parameter data channel.

The Object Dictionary

Each PCP device that exchanges information via the parameter data channel has its own *Object Dictionary*. The Object Dictionary includes:

- Each parameter's identifying *Index* number. The index is the address of the communication object. It is required to identify the object.
- An *Object Description* of the parameter features. The Object Description includes all the properties of the object, such as data type, object type, name, etc. An example Object Description is:

<i>Index Number</i>	<i>Type</i>	<i>Object Type</i>	<i>Name</i>
...	...	...	...
60 4A _{hex}	Ramp	Record	Speed quick stop
60 4B _{hex}	Integer16	Array	Setpoint factor
...	...	...	...

Object Types include:

Simple variable-type objects such as measured values, time, or device status.

Arrays, consisting of multiple simple variable objects *of the same type* that are grouped to form one object. Each element can be accessed individually. An example of an array is a range of the same type of measured values.

Records, consisting of multiple simple variable objects *of different type* that are grouped to form one object. Each element of a record can be accessed individually. An example of a record is the group of data in a test report that contains actual measured values and also the time of the measurements.

Program-invocation type objects that cause program sequences to run.

Acyclic Communication in DP/V1 Mode

Whenever data is accessed, a distinction must be made between accessing data from modules in the local bus and accessing NIU data. The table below lists the Index Numbers of different types of module data and NIU data. As the table shows, the NIU is considered to be in slot 0 and modules can be in slots 1 to 63.

Data Type	Index Number (decimal)	Module	NIU	Slot
Module parameters	2	✓		
Control byte (byte 4 of the NIU)	3		✓	0
Local bus stop acknowledgment	4		✓	0
I/O error acknowledgment	4		✓	0
Overview of PCP modules and status	5		✓	0
Deactivation of modules	6		✓	0
Activation status of modules	7		✓	0
Station ID	8		✓	0
Module parameters (power up)	9	✓		1 to 63
Set active configuration as power up configuration	10		✓	0
Delete saved configuration	11		✓	0
PCP data with Invoke ID	47	✓		1 to 63
PCP data	48	✓		1 to 63

Accessing NIU Data

When accessing the NIU, use DP/V1 format.

Accessing Module Data

The PCP data from VersaPoint I/O modules is usually addressed via 16-bit object indices. DP/V1 only has fields for 8-bit indices. More parameters have been added to the data block for use when accessing the module data in the I/O Station.

When communicating with objects on I/O Station modules, the response should be fetched using Read. Otherwise on the next communication attempt, the DP/V1 error code DF 80 B5 00 will indicate that the module is busy. The module is waiting because it has not yet had a response from the last communication.

Communication is carried out via DP/V1 Index Numbers 47 (PCP Data with Invoke ID) and 48 (PCP Data). The Object Index and assigned subindex of the I/O module are transmitted as part of the data field.

Request and Response Format

The format for all types of access (Request and Response, Read and Write) in DP/V1 is:

<DP/V1 header> <Data (PCP/DP/V1)>

The format of the DP/V1 header is always:

<DP/V1 service> <Slot> <DP/V1 index> <DP/V1 length>

The <Data (PCP/DP/V1)> is optional depending on the service. It has the following structure:

Access	Service	Data
Write objects (NIU)	Request	Object data
	Response	None
Read objects (NIU)	Request	None
	Response	Object data
Write objects (I/O modules)	Write request (Write)	Write PCP/Index high/Index low/Subindex/Length of PCP data/x bytes of PCP object data
	Write response (Write)	None
	Read request (Write)	None
	Read response (Write)	PCP acknowledgment
Read objects (I/O modules)	Write request (Read)	Read PCP/Index high/Index low/Subindex
	Write response (Read)	None
	Read request (Read)	None
	Read response (Read)	PCP acknowledgment
Write objects with Invoke ID	Write request (Write)	Invoke ID/Write PCP/Reserved/Reserved/ Reserved/ Reserved/Index high/Index low/ Reserved/Subindex/ Reserved/Length of PCP data/x bytes of PCP object data
	Write response (Write)	None
	Read request (Write)	None
	Read response (Write)	Invoke ID (mirrored)/Write PCP/ Reserved/ Reserved
Read objects with Invoke ID	Write request (Read)	Invoke ID/Read PCP/Reserved/Reserved/ Reserved/ Reserved/Index high/Index low/ Reserved/Subindex
	Write response (Read)	None
	Read request (Read)	None
	Read response (Read)	Invoke ID (mirrored)/Read PCP/Reserved/ Reserved/ Reserved/Length of PCP data/ x bytes of PCP object data

In the event of a faulty response, the format is:

- For a DP/V1 error:

<DP/V1 service> <Error decode> <Error code 1> <Error code 2>

- For an I/O module error:

<DP_V1 service> <Slot> <DP_V1 index> <DP_V1 length> <Error data (PCP_DP_V1)>

Parameter Definitions

<DP/V1 service>

In the request there is a distinction between DP/V1 Read (5E hex) and DP/V1 Write (5F hex); in the error response there is a distinction between DE hex (Read error) and DF hex (Write error).

<Slot>

The slot of the VersaPoint module to be addressed in the I/O Station. The NIU is addressed using Slot = 0, the first I/O module using Slot = 1, the second using Slot = 2, etc. The slot provides a reference to a specific module, e.g., also for the module parameters.

<DP/V1 index>

The Index Number that should be used for accessing local bus communication objects is 48 dec (30 hex). Indices 2 to 5 should be used for all other services. Index 47 dec is reserved for future use and should therefore not be assigned.

<DP/V1 length>

On a write access, the length of the subsequent data is entered here. On a read access, the length of the expected data is entered. On a response, this parameter contains the actual length of the DP/V1 data.

<Error data (PCP/DP/V1)>

Contains the error codes from the PCP access to the local bus.

<Error decode>

80 hex indicates an error in DP/V1.

<Error code 1> and <Error code 2>

Contain the error codes from the DP/V1 access.

<Write PCP/Read PCP>

Indicates whether the following object index should be written or read.
Read PCP = 01 hex ; Write PCP = 02 hex .

<Object data>

The content of an object whose length and scope is described by <DP/V1 length>.

<Index high and Index low>

Specifies the Object Index of the addressed PCP object in two bytes. For example, for index 5FE0 hex the value 5F hex should be entered for Index high and the value E0 hex should be entered for Index low.

<Subindex>

When working with a PCP object, the subindex can be used to select a specific element from an array or record.

<Length of PCP data>

Specifies how many bytes of PCP object data (object contents) follow.

<PCP object data>

The actual contents of a PCP object.

<PCP acknowledgment>

The structure of a PCP acknowledgment is:

<Message code> <Result> <Length of PCP data> <PCP object data> or
<Message code> <Result> <PCP error code>

<Invoke ID>

The Invoke ID is one byte in length and is used for channel selection on some modules.

The message code is 81_{hex} (PCP Read) or 82_{hex} (PCP Write). The result has the function of a status byte (0 means "OK", 44_{hex} means "general error"). "Length of PCP data" and "PCP object data" only contain specific values on a read response (Read). "Length of PCP data" specifies how many bytes of PCP object data (object contents) follow. The "PCP object data" contains the actual contents of a PCP object. In the event of an error, the status byte is directly followed by the PCP error code.

When accessing PCP, the first byte in the DP/V1 data block uses PCP Read (= 01_{hex}) and PCP Write (= 02_{hex}) to indicate whether the PCP object should be read or written.

DP/V1 Examples

The examples on the following pages show how objects on the NIU and the I/O modules can be read and written.

Modules in the Examples

In this example, the VersaPoint I/O Station includes:

Slot 0: Profibus-DP NIU, IC220PBI002

Slot 1: 24V 8-Point Discrete Output Module IC220MDL753

Slot 2: 24V 8-Point Discrete Input Module, IC220MDL643

Slot 3: RS-232 Communications Module, IC220BEM232

Slot 4: Analog 2-Ch. Voltage/Current Input Module IC220ALG220

Slot 5: Analog 1-Ch. Voltage/Current Output Module, IC220ALG320

Object Dictionary of the RS-232 Communications Module

Index (hex)	Data Type	Number of Elements	Length (bytes)	Meaning	Object Name	Access Permitted
5FC1	Variable of Unsigned 8	1	1	Module start indicator	START-IND	read/write
5FE0	String Variable of Octet String	1	58	Transmit/receive RS-232 data	V24-DATA	read/write
5FFF	Array of Unsigned 8	20	1	Module configuration	INIT-Table	read/write

Example Object Description

The Object Description below is a write service that writes the INIT-TABLE object to configure the RS-232 module.

Object	INIT-TABLE			
Access	Read, write			
Data Type	Array of Unsigned 8			
Index	5FFF _{hex}			
Subindex	00 _{hex}	Write all elements	09 _{hex}	3964R Priority
	01 _{hex}	Protocol	0A _{hex}	Output type
	02 _{hex}	Baud rate	0B _{hex}	DTR control system
	03 _{hex}	data width	0C _{hex}	Rotation switch/
	04 _{hex} , 05 _{hex}	Reserved	0D _{hex}	XON Pattern
	06 _{hex}	Error Pattern	0E _{hex}	XOFF Pattern
	07 _{hex}	First Delimiter	0F _{hex} to 14 _{hex}	Reserved
	08 _{hex}	Second Delimiter		
Length (bytes)	14 _{hex} Sunindex 00 _{hex} 01 _{hex} Subindex 01 _{hex} to 14 _{hex}			
Data	VersaPoint RS-232 module configuration			

Example Configuration of the VersaPoint RS-232 Module

The RS-232 Module parameters have default values. These are shown in the example INIT-TABLE object below.

Element		Meaning	Default Setting		Data Type
Decimal	Hex		Code (hex)	Meaning	
1	1	Protocol	00	Transparent	Unsigned 8
2	2	Baud rate	07	9600 baud	Unsigned 8
3	3	Data width	02	8 data bits, even parity, 11 stop bit	Unsigned 8
4	4	Reserved	00		Unsigned 8
5	5	Reserved	00		Unsigned 8
6	6	Error pattern	24	(\$)	Unsigned 8
7	7	First delimiter	0D	Carriage return (CR)	Unsigned 8
8	8	Second delimiter	0A	Line Feed (LF)	Unsigned 8
9	9	3964R priority	00	Low	Unsigned 8
10	A	Output type	00	V.24 (RS-232)	Unsigned 8
11	B	DTR control system	00	Automatic	Unsigned 8
12	C	Rotation switch	00	No rotation	Unsigned 8
13	D	XON pattern	11		Unsigned 8
14	E	XOFF pattern	12		Unsigned 8
15-20	F-14	Reserved	00		Unsigned 8

The Profibus-DP/V1 NIU also has objects (see "Object Dictionary for the PROFIBUS DP-V1 Bus Coupler" on page 7-12). Together, these INIT-TABLE and the NIU objects illustrate how an intelligent slave can be accessed.

Assignment of Object Indices to the I/O Station

Slot	Index	Service	Comments
0	3	Write	Control byte (diagnostic format, manual I/O error acknowledgement, etc)
0	4	Write	Acknowledgement of local bus event: 1: Local bus stop acknowledgement 2: I/O error acknowledgement
0	5	Read	Overview of PCP modules and status
1 to 63	2	Write	Module parameters
1 to 63	48	Read/Write	PCP data

*Example 1, Reading the Connected Local PCP Devices and Their Status
(Slot 0, Index 5 on the NIU)*

The data shows that there is a PCP device on slot 3, and its connection status is OK, see "Object Dictionary for the Profibus DP/V1 NIU". Byte 3 of the object data is reserved.

Read request (master -> slave)

<i>Data</i>	<i>Data Structure</i>
5E 00 05 20	Read/Slot/Index/Maximum length

Read response (slave -> master)

<i>Data</i>	<i>Data Structure</i>
5E 00 05 03 03 01 00	Read/Slot/Index/Actual length/3 bytes of object data.

Example 2, Reading Object 5FFF; Subindex 2 of a VersaPoint RS-232 Module on Slot 3, Accessing an I/O Module

This example illustrates how the write and read sequence provides the requested value when a value is read. In this case, the write response does not contain any data. It simply indicates that a write request was received at the Profibus-D/V1 NIU. The data is only delivered by the read action.

81_{hex} means that PCP read has been executed. The status is 00_{hex}, which indicates that there were no errors. 01_{hex} indicates the length of the subsequent data and 07_{hex} is the value stored under 5FFF, subindex 2, see "INIT-TABLE object elements" on page 3-15.

Write request (master -> slave)

Data	Data Structure
5F 03 30 04 01 5f ff 02	Write/Slot/Index/Length/Read PCP/Index high/Index low/Subindex

Write response (slave -> master)

Data	Data Structure
5F 03 30 04	Write/Slot/Index/Length

Read request (master -> slave)

Data	Data Structure
5E 03 30 28	Read/Slot/Index/Maximum length

Read response (slave -> master)

Data	Data Structure
5E 03 30 04 81 00 01 07	Read/Slot/Index/Actual length/4 bytes of object data

Example 3, Manual Acknowledgment of I/O Errors
(Writing to the NIU, Slot 0, Index 4)

In this example, the data block is only important in the request. The response indicates that the command has been received. As can be seen in "Object Dictionary for the Profibus DP/V1 NIU", I/O errors should be acknowledged using bit 1 (02 hex) at index 4, slot 0.

Write request (master -> slave)

Data	Data Structure
5F 00 04 01 02	Write/Slot/Index/Length/1 byte of data

Write response (slave -> master)

Data	Data Structure
5F 00 04 0	Write/Slot/Index/Length

Example 4, Writing to Object 5FFF; Subindex 0 of a VersaPoint RS-232 Module on Slot 3

This example shows how subindex 00_{hex} can be used to write to all the subindices of a PCP object on an I/O module in a single step.

In the write request data block, 14_{hex} indicates the length of the subsequent data. This is followed by the data, which is transmitted in this order according to the structure of the object.

The read response is simple. The data block receives 82_{hex} to confirm that the PCP data has been written. 00_{hex} again indicates the OK status.

A maximum of 58 bytes of PCP data should be transmitted per command.

Write request (master -> slave)

Data	Data Structure
5F 03 30 19 02 5F FF 00 14 00 06 02 00 00 24 0D 0A 00 00 00 00 11 13 00 00 00 00 00 00	Write/Slot/Index/Total length of data/Write PCP/Index high/ Index low/Subindex/Length of PCP data/20 bytes of object data

Write response (slave -> master)

Data	Data Structure
5F 03 30 19	Write/Slot/Index/Length

Read request (master -> slave)

Data	Data Structure
5E 03 30 28	Read/Slot/Index/Maximum length

Read response (slave -> master)

Data	Data Structure
5E 03 30 02 82 00	Read/Slot/Index/Actual length/2 bytes of data (PCP acknowledgment)

Example 5, In the Event of an Error: Reading a Non-Existent Object on an I/O Module with PCP Functions (Access to 5C00, Subindex 0 on a VersaPoint RS-232 Communications Module, Slot 3)

This example write request has a similar structure to example 2. However, instead of index 5FFF and subindex 2, index 5C00 and subindex 00 are requested.

As in example 2, the write response is used to indicate that the command has been received. Processing on the I/O Station local bus starts afterwards. 81_{hex} indicates the execution of the command, and 44_{hex} indicates a basic error.

In this example, the PCP Read cannot be processed because the object does not exist. The problem is indicated by the error code 06_{hex} and 07_{hex} within the object data of the read response. The 2 bytes at the end may provide additional information about an error, but they are not used in this case. The error is on the lower-level local bus; it is not a DP/V1 error. 44_{hex} as the response status always indicates an I/O module error.

Write request (master -> slave)

Data	Data Structure
5F 03 30 04 01 5C 00 00	Write/Slot/Index/Length/Read PCP/Index high/Index low/Subindex

Write response (slave -> master)

Data	Data Structure
5F 03 30 04	Write/Slot/Index/Length

Read request (master -> slave)

Data	Data Structure
5E 03 30 28	Read/Slot/Index/Maximum length

Read response (slave -> master)

Data	Data Structure
5E 03 30 06 81 44 06 07 00 00	Read/Slot/Index/Actual length/6 bytes of object data

Example 6, In the Event of an Error: Reading an Object on an I/O module Without PCP Functions (Access to 5FF0, Subindex 0 on an 8-Point Discrete Output Module at Slot 2)

In example 6, DF_{hex} in the write response means the service cannot be executed. The service cannot be sent to the I/O module, so the error code is indicated immediately. For this type of error, the DP/V1 error codes are helpful, see Appendix "Error Codes for DP_V1 and VC1Communication" on page 7-17. In this example, 80_{hex} means that the error is a DP/V1 error. D200 indicates that the module does not have PCP. The process should stop immediately after the write action. However, if the system tries to read the result on slot 2, D4 00 is output ("Incorrect service", see Section "Error Codes for DP_V1 and VC1 Communication" on page 7-17). This indicates that the command is not expected at present. There is no read data available at the slot.

If the system includes I/O modules that do not establish the PCP connection immediately after power up, error code D1_{hex} may occur when PCP communication is attempted. This code indicates that there is (still) no PCP connection. An attempt is made to establish this connection with the module so the problem will not recur the next time a communication attempt is made.

Index 5 can be used to request the PCP status and to establish communication if all PCP devices do not have a connection. To do this, write 01_{hex} on slot 0, index 5.

This example also shows function code DE_{hex} (Read error) or function code DF_{hex} (Write error) in connection with error code 80_{hex}. These indicate errors on the DP/V1 level. More general DP/V1 error codes are listed in EN 50170, PROFIBUS Guideline 2.082.

Write request (master -> slave)

Data	Data Structure
5F 02 30 04 01 5f ff 00	Write/Slot/Index/Length/Read PCP/Index high/Index low/Subindex

Write response (slave -> master)

Data	Data Structure
DF 80 D2 00	Write error/Error decode/Error code 1/Error code 2

Read request (master -> slave)

Data	Data Structure
5E 02 30 28	Read/Slot/Index/Maximum length

Read response (slave -> master)

Data	Data Structure
DE 80 D4 00	Read error/Error decode/Error code 1/Error code 2

PCP Communication Via Process Data (Class 1 Master in DP/V0 Mode)

If the control system is not DP/V1-compatible, it is still possible to operate complex devices using acyclic services within the process data, as described in this section.

Mechanism for Transmission in the Process Data

The mechanism for transmitting parameter data with the application's process data is a Virtual C1 "module" (VC1 module), which can be set up in the I/O Station configuration. The Virtual C1 module is not linked to a specific module in the I/O Station. During active data exchange, the Virtual C1 module can be assigned sequentially to different I/O Station modules with communications objects. This makes it possible to exchange parameter data in parallel with process data.

The Virtual C1 module is listed in the Profibus-DP/V1 NIU's GSD file as "PD-PCP x words"). It must be configured in the first position after the NIU. It is not linked to any hardware, so a module is not actually inserted.

Process Data Width of the Virtual C1 "Module"

The process data width occupied by the Virtual C1 module in the process data channel can be selected from 4 to 16 words in increments of 2 words. If there are sufficient free resources, a data width of up to 16 words can be used. Because the user data can be up to 58 bytes (29 words) per communication, it may be necessary to split the user data and transmit it in several steps.

This leads to:

- Start fragment
- Continue fragment
- End fragment
- Error or abort fragment

Each fragment contains a service byte, which is used for the precise assignment of the fragment. The individual fragments and the service byte are explained in detail on the next page.

Start Fragment

Byte 1	Service
Byte 2	Module number
Byte 3	Index high
Byte 4	Index low
Byte 5	Subindex
Byte 6	Length, if required
Byte 7	Data block, if required
...	
Byte n	Data block, if required

Byte 1 - Service in start fragment:

7	6	5	4	3	2	1	0
Request/ response	0	0	Fragment -ation	Action			

Bit 7: Request/response

- 0 = Request
- 1 = Response

Bits 6 to 5: Fragment type

- 00 = Start fragment

Bit 4 Fragmentation

- 0 = Not fragmented
- 1 = Fragmented

Bits 3 to 0: Action

00 _{hex}	No action (clear)
01 _{hex}	Read PCP (I/O module)
02 _{hex}	Write PCP (I/O module)
03 _{hex}	Read (bus coupler)
04 _{hex}	Write (bus coupler)
05 _{hex}	Read PDU length (displayed in bytes)
06 _{hex}	Read PCP with Invoke ID (I/O module)
07 _{hex}	Write PCP with Invoke ID (I/O module)
08 _{hex} to 0F _{hex}	Reserved

In the start fragment, enter the Invoke ID for actions 6 and 7 (read/write with the Invoke ID) after the module number. Bytes 3 to n are then entered at byte 4.

Actions 01_{hex} and 02_{hex}, and 06_{hex} and 07_{hex} refer to PCP; these commands can be used to access PCP modules. Actions 03_{hex} and 04_{hex} are used to read or write objects on the NIU (object indices 2 to 5).

Continue Fragment

Byte 1 Service
Byte 2 Data block, if required
 ...
Byte n Data block, if required

Byte 1 - Service in continue fragment

7	6	5	4	3	2	1	0
Request/ response	0	1	Fragment number (01 _{hex} - 1F _{hex})				

Bit 7 **Request/response**
 0 = Request
 1 = Response

Bits 6 to 5 **Fragment type**
 01 = Continue fragment

Bits 4 to 0 **Counter**
 01_{hex} to 0F_{hex} Fragment number. If more fragments are required,
 continue with 0 after 1F_{hex}.

End Fragment

Byte 1 Service
Byte 2 Data block, if required
 ...
Byte n Data block, if required

Byte 1 - Service in end fragment

7	6	5	4	3	2	1	0
Request/ response	1	0	Reserved				

Bit 7 **Request/response**
 0 = Request
 1 = Response

Bits 6 to 5 **Fragment type**
 10 = Last fragment (end fragment)

Bits 4 to 0 **Reserved**

Abort/Error Fragment:

Byte 1 Service
Byte 2 Error code, if required
 ...
Byte n Error code, if required

Byte 1 - Service in abort/error fragment

7	6	5	4	3	2	1	0
Request/ response	1	1	Reserved				

Bit 7 **Request/response**
 0 = Request
 1 = Response

Bits 6 to 5 Fragment type
 11 = Abort/error fragment

Bits 4 to 0 Reserved

Communication can be reset using 60_{hex} so that all buffers involved in the communication are set to their initial status.

When a service is complete, this should be acknowledged (clear) using service 00 (the other bytes of the Virtual C1 module are then "don't cares"). A handshake is implemented, which indicates to the Profibus DP/V1 NIU that the result has been received by the master. The Virtual C1 module can then receive the next service.

Responses

A response is sent after every request. The response indicates that the request has been received and shows its current status:

Response Structure:

Byte 1	Service (response bit is set)
Byte 2	Status, if required
Byte 3	Length, only on first read response
...	
Byte n	Data block, if required

The status is indicated when local PCP transmission is complete and in the event of an error. In the event of an error, the data block can provide details. An error has occurred if the value of the status byte does not equal 00_{hex}.

00 _{hex}	No error
44 _{hex}	PCP module error

For the Virtual C1 module, the parameters have the following meaning:

<Module number>

The NIU counts as module 0, the first configured module as 1, the second as 2, etc. Only devices with diagnostics should be configured and are "active" devices in the station.

<Index high and Index low>

Specifies the object index of the addressed object in two bytes. This also applies for objects on the NIU. For example, for index 5FE0_{hex} the value 5F_{hex} should be entered for Index high and E0_{hex} for Index low. For index 4_{hex} on the NIU, 00_{hex} is Index high and 04_{hex} is Index low.

<Subindex>

The subindex can be used to select a specific element from an array or record. The NIU has no arrays or records, so subindex 0 should be entered.

<Length>

Specifies how many bytes of object data (object contents) follow. Depending on the module, this may be NIU object data or I/O module object data.

<Data block>

This is only the content of an object. The length and scope of the data are described by the <Length> parameter.

<Invoke ID>

The Invoke ID is one byte in length and is used for channel selection on some modules.

Examples of Communications using a Virtual C1 Module

The same examples are used here as for DP/V1 services..

Example 1, Reading the Connected Local PCP Devices and Their Status (Slot 0, Index 5 on the NIU)

Read request (master -> slave)

Data (4 Words VC1)	Data Structure
03 00 00 05 00 00 00 00	Read/Slot/Index high/Index low/Subindex 3 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
83 00 03 03 01 00 00 00	Read response/Status/Actual length/3 bytes of object data 2 bytes unused

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Example 2, Reading Object 5FFF, Subindex 2 of a VersaPoint RS-232 Communications Module on Slot 3

Read request (master -> slave)

Data (4 Words VC1)	Data Structure
01 03 5F FF 02 00 00 00	Read PCP/Slot/Index high/Index low/Subindex 3 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
81 00 01 07 00 00 00 00	Read response/Status/Actual length/1 byte of object data 4 bytes unused

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

*Example 3, Manual Acknowledgment of I/O Errors
(Writing to the Profibus NIU, Slot 0, Index 4)*

Write request (master -> slave)

Data (4 Words VC1)	Data Structure
04 00 00 04 00 01 02 00	Write/Slot/Index high/Index low/Subindex I Length/Data I 1 byte unused

Write response (slave -> master)

Data (4 Words VC1)	Data Structure
84 00 00 00 00 00 00 00	Write response/Status I 6 bytes unused

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Example 4, Writing to Object 5FFF, Subindex 0 of a VersaPoint RS-232 Communications Module on Slot 3

Write request (master -> slave) – start fragment

Data (4 Words VC1)	Data Structure
12 03 5F FF 00 14 00 06	Write PCP/Slot/Index high/Index low/Subindex/Length/2 bytes of data

Write response (slave -> master)

Data (4 Words VC1)	Data Structure
12 1 00 00 00 00 00 00	Write response/7 bytes unused

Write request (master -> slave) – 1st continue fragment

Data (4 Words VC1)	Data Structure
21 02 00 00 24 0D 0A 00	Write/7 bytes of data

Write response (slave -> master)

Data (4 Words VC1)	Data Structure
21 1 00 00 00 00 00 00	Write response 7 bytes unused

Write request (master -> slave) – 2nd continue fragment

Data (4 Words VC1)	Data Structure
22 00 00 00 11 13 00 00	Write/7 bytes of data

Write response (slave -> master)

Data (4 Words VC1)	Data Structure
22 1 00 00 00 00 00 00	Write response 7 bytes unused

Write request (master -> slave) – end fragment

Data (4 Words VC1)	Data Structure
40 00 00 00 00 1 00 00 00	Write/4 bytes of data 3 bytes unused

Write response (slave -> master) This write response with service 82_{hex} is the acknowledgment of write request with 12_{hex} in the start fragment.

Data (4 Words VC1)	Data Structure
82 00 1 00 00 00 00 00	Write response/Status 6 bytes unused

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Example 5, Reading a Non-Existent Object on an I/O Module with PCP Functions (Access to 5C00, Subindex 0 on a VersaPoint RS-232 Communications Module2, Slot 3)

Read request (master -> slave)

Data (4 Words VC1)	Data Structure
01 03 5C 00 00 00 00 00	Read PCP/Slot/Index high/Index low/Subindex 3 bytes unused

Read response (slave -> master) 44_{hex} in the read response of the start fragment indicates an error. 06_{hex} and 07_{hex} in this example are the error code, which indicates that the addressed index does not exist, see also "Error Codes for PCP Communication" on page7-19.

Data (4 Words VC1)	Data Structure
81 44 06 07 00 00 00 00	Read response/Status/4 bytes of error code 4 bytes unused

Abort request (master -> slave) Communication can be reset using 60_{hex} so that all buffers involved in the communication are set to their initial status.

Data (4 Words VC1)	Data Structure
60 xx xx xx xx xx xx xx	Abort

Abort response (slave -> master)

Data (4 Words VC1)	Data Structure
E0 00 00 00 00 00 00 00	Abort response

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Example 6, In the Event of an Error: Reading an Object on an I/O Module Without PCP Functions (Access to 5FF0, Subindex 0 on an 8-Point Discrete Output Module at Slot 2)

Read request (master -> slave)

Data (4 Words VC1)	Data Structure
01 02 5F F0 00 00 00 00	Read PCP/Slot/Index high/Index low/Subindex 3 bytes unused

Read response (slave -> master) D2_{hex} in the read response indicates an error. An error has occurred if the second byte of the response (= status byte) does not equal 0, see "Error Codes for DP/V1 and VC1Communication".

Data (4 Words VC1)	Data Structure
81 D2 00 00 00 00 00 00	Read response/Status or 2 bytes of error code 5 bytes unused

Abort request (master -> slave) Communication can be reset using 60_{hex} so that all buffers involved in the communication are set to their initial status.

Data (4 Words VC1)	Data Structure
60 xx xx xx xx xx xx xx	Abort

Abort response (slave -> master)

Data (4 Words VC1)	Data Structure
E0 00 00 00 00 00 00 00	Abort response

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Example 7, Example Read on VersaPoint RS-232 Communications Module, Slot 3, Object 5FFF, Subindex 0 (additional example)

Read request (master -> slave) – start fragment

Data (4 Words VC1)	Data Structure
01 03 5F FF 00 00 00 00	Read PCP/Slot/Index high/Index low/Subindex I 3 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
91 00 14 00 07 02 00 00	Read response/Status/Actual length/5 bytes of object data

Read request (master -> slave) – acknowledgement of start fragment

Data (4 Words VC1)	Data Structure
91 xx xx xx xx xx xx xx	Read/7 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
A1 24 0D 0A 00 00 00 00	Read response/7 bytes of object data

Read request (master -> slave) – acknowledgement of 1st continue fragment

Data (4 Words VC1)	Data Structure
A1 xx xx xx xx xx xx xx	Read/7 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
A2 11 13 00 00 00 00 00	Read response/7 bytes of object data

Read request (master -> slave) – acknowledgement of 2nd continue fragment

Data (4 Words VC1)	Data Structure
A2 xx xx xx xx xx xx xx	Read/7 bytes unused

Read response (slave -> master)

Data (4 Words VC1)	Data Structure
C0 00 01 00 00 00 00 00	Read/1 byte of object data I 6 bytes unused

Read request (master -> slave) – acknowledgement of end fragment

Data (4 Words VC1)	Data Structure
C0 xx xx xx xx xx xx xx	Read/7 bytes unused

Clear request (master -> slave)

Data (4 Words VC1)	Data Structure
00 xx xx xx xx xx xx xx	Clear

Clear response (slave -> master)

Data (4 Words VC1)	Data Structure
00 00 00 00 00 00 00 00	Clear response

Format of the Parameter Telegram

This section provides a detailed description of the format of the parameters for the Profibus NIU and the input and output modules. This may be useful when setting parameters using acyclic services or if there is no interface for the simple selection of parameters. One possible application is changing the parameters of failsafe values during operation.

Parameterization in data exchange mode is not permitted for the configuration data (measuring range, sensor type, etc.).

The data for the configuration and the failsafe value can be found in the module datasheets.

NIU Parameters

Bytes 1 to 7	DP standard		
Bytes 8 to 10	DP/V1 standard		
Byte 11	<i>Control byte</i>		
	Bit 7, Bit 6	0	Reserved
	Bit 5	0	DXCH only for Global Control OPERATE
		1	DXCH without Global Control OPERATE
	Bit 4	0	Do not rotate DI 16 and DO 16 data
		1	Rotate DI 16 and DO 16 data
	Bits 3 to 2	00	Status PDU
		01	ID-specific module diagnostics
		10	Old diagnostics
	Bit 1	0	Automatic error acknowledgment
		1	Must be acknowledged via acyclic channel
	Bit 0	0	No stop on error
		1	Stop on error

Module Parameters

Byte 1	Bit 7 to bit 6	00 Start block ID for the device
	Bit 5 to bit 4	Configuration
		00 No configuration (discrete output modules, no configuration value block)
		01 Permanent configuration
		10 Temporary configuration
	Bit 3 to bit 2	Failsafe value
Byte 2	Bit 1	00 No failsafe value (discrete input modules, no failsafe value block)
		01 Zero is output
		10 Value is maintained
		11 Value from data field is used
		PCP
		0 No PCP block
Byte 3 to n	Bit 0	1 PCP block
	Bit 0	0 Module activated
		1 Module deactivated
Byte 2	Bit 7 to bit 6	01 ID for configuration block
	Bit 5 to bit 0	Length of the data block
Byte 3 to n		N data bytes

Byte x	Bit 7 to bit 6	10 ID for failsafe value block
	Bit 5 to bit 0	Length of the data block
Byte x to y		N data bytes

Byte x	Bit 7 to bit 6	11 ID for PCP block
	Bit 5 to bit 0	Length of the data block (including index/subindex)
Byte x+1		Index high byte
Byte x+2		Index low byte
Byte x+3		Subindex
Byte x+4 to y		N data bytes

Object Dictionary for the Profibus-DP/V1 NIU

Slot	Index	Service	Comments
1 to 63	2	Write	Module parameters
0	3	Write	Control byte (diagnostic format, manual I/O error acknowledgement, etc)
0	4	Write	Acknowledgement of local bus event 1: Local bus stop acknowledgement 2: I/O error acknowledgement
0	5	Read/Write	Overview of PCP modules and status
0	6	Read/Write	Activate/deactivate modules
0	7	Read/Write	Activation status of modules
0	8	Read/Write	Station I/D
1 to 63	9	Read/Write	Module parameters (powerup)
0	10	Write	Set active configuration as powerup configuration
0	11	Write	Delete save configuration
0 to 63	47dec	Read/Write	PCP communication with Invoke ID
1 to 63	48dec	Read/Write	PCP communication

The structure of the objects is as follows:

Index 2: Module Parameters

Index 2 can be used on some modules to change parameters during operation, e.g., to adjust a measuring range. Changing parameters during operation is not permitted for all modules.

Failsafe and configuration values can be specified here for each I/O module. Slot "1 to 63" should be selected to create a reference to the I/O module. In the end it is the NIU that makes the connection to the master and therefore index 2 is the parameter that refers to the I/O modules, which is stored on the NIU.

Index 3: Control Byte

The parameter telegram provides a user-specific byte for the NIU, which can be used to select the diagnostic format. In addition to transmission in the parameter telegram (byte 11) it is also possible to specify the byte under index 3 and therefore to change the parameters during operation.

Bit 0	0	No stop on error (local bus)
	1	Stop on error (local bus)
Bit 1	0	Automatic error acknowledgement (eg: on I/O errors)
	1	Manual acknowledgement required
Bit 3 to bit 2	00	Status PDU format
	01	ID-specific diagnostics
Bit 4	0	DI 16 and DO16 format byte 0/byte 1
	1	DI16 and DO16 format byte 1/byte 0
Bit 5	0	Data exchange with broadcast "Operate"
	1	Data exchange without broadcast "Operate"
Bit 6	0	DI 32 and DO32 format slot 1/2/3/4 – byte 3/2/1/0
	1	DI32 and DO32 format slot 1/2/3/4 – byte 0/1/2/3
Bit 7	Reserved	

As mentioned, the behavior in the event of a local bus error is set via the parameter telegram. Please note that "Stop on error (local bus)" indicates that the local bus switches to the STOP state after 10 consecutive faulty data cycles. In the case of "No stop on error (local bus)", an attempt is made continuously to keep the local bus operating and to automatically restart the local bus following error removal. The set behavior only takes effect in the event of errors in the local bus.

Index 4: Acknowledgment of Local Bus Event

By default, I/O errors are acknowledged automatically and the local bus remains in the Run state whenever possible.

Depending on the application, automatic acknowledgment may not be permitted and special measures may be required. In this case it is possible to respond to bus events manually via index 4. This applies for an error on a module (I/O error that has to be acknowledged), and also after a serious error prevents further data communication.

Bit 0	Acknowledgement of local bus stop
Bit 1	I/O error acknowledgement
Bit 7 to bit 2	Reserved

Index 5: Overview of PCP Modules and Status

3 bytes are provided for each connected PCP module.

Index 5 can be used to request the PCP communication status and even establish communication if all PCP devices do not yet have a connection. To do this, write 01_{hex} on slot 0, index 5.

Byte 1	Position in station (slot)
Byte 2	Status of PCP connection 0x00 _{hex} No connection 0x01 _{hex} Connection OK 0xFF _{hex} Error establishing connection
Byte 3	Reserved

Index 6: Activation/Deactivation of Modules and Slots

Slots can be deactivated via index 6. This setting is stored retentively. During power up, index 6 is adjusted to the configuration and parameterization stored on the PLC. The deactivated modules are logically ORed. However, this means that some slots will be configured although no modules are connected to them.

Make sure that no modules are inserted in "deactivated" slots. Otherwise a configuration error will be displayed.

Byte 1								Byte 2								Bytes 3 ... 7	Byte 8							
8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9	...	x	63	62	61	60	59	58	57

Bit = 1: Module and slot inactive

Bit = 0: Module and slot active

Index 7: Read back active/inactive terminals and slots

Index 7 can be used to read back which slots have been deactivated. The status is obtained from the parameterization during hardware configuration and index 6 via a logic OR operation.

Byte 1								Byte 2								Bytes 3 ... 7	Byte 8							
8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9	...	x	63	62	61	60	59	58	57

Bit = 1: Module and slot inactive

Bit = 0: Module and slot active

Index 8: Read/write ID Access: Read and write

Length = 2 bytes

Each Profibus NIU, PBI002, can be assigned an individual ID. This ID is stored retentively and can be used to identify a station if it was disconnected from the power supply. This means that several stations can be operated alternately under the same station address in Profibus. The ID can also be read cyclically in the process data.

Index 9: Module Parameters (Power Up)

Module parameters can be stored here if there is a longer period of time between powering up the I/O Station and establishing a connection to the PLC, in which failsafe values are to be output, for example. The parameterization from the hardware configuration is then enabled with the PLC parameter telegram.

Index 10: Set Active Configuration as Power Up Configuration

The active configuration is set as the reference configuration. Before the PLC configuration telegram is evaluated, a check is carried out during powerup to determine whether the active configuration corresponds to the last configuration used. If it does not correspond, the station is not started and an error is indicated. This is particularly important in conjunction with index 9 (e.g., for retentively stored failsafe values).

Index 11: Delete Saved Configuration

All data that has not been stored retentively can be deleted (write 01_{hex}). The device is thus returned to its default state.

Index 47: PCP Data With Invoke ID

Index 47 is a parameter on the NIU. It is used to establish the connection between the master and I/O module for DP/V1/PCP communication. It is used when the Invoke ID is to be transmitted.

Index 48: PCP Data

Index 48 is a parameter on the NIU. It is used to establish the connection between the master and I/O module for DP/V1/PCP communication. The slot number (1 to 63) is required.

Error Codes for DP/V1 and VC1 Communication

Always observe the individual displays in your working environment.

DP/V1 error:

Function code (response) = DE_{hex} (Read error) or DF_{hex} (Write error)

Error decode = 80_{hex} (DP/V1 communication)

Error with reference to I/O module: Status 44_{hex} indicates an error (for DP/V1 on byte 2 of the data block; for VC1 on byte 2 in the response)

Error Code 1 (hex)	Error Code 2	Error Description
A0 _{hex}	0	Module object cannot be read
A1 _{hex}	0	Module object cannot be written
B0 _{hex}	0	Incorrect module index
B1 _{hex}	0	PB PDU length is too short
B2 _{hex}	0	Incorrect slot
B5 _{hex}	0	Module is busy
B7 _{hex}	0	Error writing to index 47 or 48
D1 _{hex}	0	No PCP connection
D2 _{hex}	0	Module has no PCP
D3 _{hex}	0	Module timeout
D4 _{hex}	0	Incorrect service
D5 _{hex}	0	V1 sequence incorrect
D6 _{hex}	0	VC1 length incorrect
Fx _{hex}	0	Error writing module parameters
F1 _{hex}	0	Invalid module number was used
F2 _{hex}	0	Parameter block was not complete
F3 _{hex}	0	Data length of the parameter block is too short
F4 _{hex}	0	Data length of the parameter block is too long
F5 _{hex}	0	The internal block for configuration, failsafe value, and PCP is too small
F6 _{hex}	0	The header byte for the module parameter block is incorrect
F7 _{hex}	0	PCP initialization for a module without PCP functions
F8	0	Too many data blocks for the module

Error Codes for PCP Communication

05_{hex}/01_{hex} (state conflict)

Meaning	A start or stop command was sent twice.
Cause	This error only occurs on a start or stop service: As the start or stop has already been executed, the service cannot be executed again.
Remedy	No action required.

06_{hex}/02_{hex} (hardware fault)

Meaning	Access to the object failed due to a hardware fault.
Cause	For example, no I/O voltage.
Remedy	Remove the hardware fault.

06_{hex}/03_{hex} (object access denied)

Meaning	The object has limited access rights.
Cause	It may be a read-only object or password-protected.
Remedy	Check the access rights in the object description.

06_{hex}/05_{hex} (object attribute inconsistent)

Meaning	A service parameter has been specified with a value that is not permitted.
Cause	For example, an incorrect length specification or subindex that is not permitted.
Remedy	Check the parameters in the object description and send the service again with the corrected values.

06_{hex}/06_{hex} (object access unsupported)

Meaning	The service used cannot be applied to this object.
Cause	For example, a program sequence can be started or stopped, but not read.
Remedy	Check the object description to find out which services are supported for this object.

06_{hex}/07_{hex} (object non-existent)

Meaning	The object does not exist.
Cause	The "Index" parameter probably contains an invalid value.
Remedy	Check the object index in the object description and send the service again.

Other Error Messages

08_{hex}/00_{hex} (application error)

Meaning	Device-specific error message; no communication error.
Cause	-
Remedy	Refer to device description.

Depending on the I/O module, other specific error codes may also be used. These codes are listed in the relevant data sheet/user manual.

This section summarizes the standard data for a VersaPoint Profibus I/O system. Please refer to the module-specific data sheets for additional information.

- Network Specifications
- I/O Station Information
- Ambient conditions
- Mechanical Demands
- Noise Immunity Test
- Electrical Specifications
- Cables
- I/O Modules
- Air and Creepage Distances
- Test Voltages

The data is valid for the preferred mounting position (vertical).

I/O Station Information

System Information	
Number of devices per station	63, maximum
Sum of all I/O data per station	184 bytes, maximum
PROFIBUS-DP Interface	Copper cable (RS-485), connected via D sub shield connector; supply electrically isolated, shielding directly connected with functional earth ground.
Maximum NIU current for supplying the I/O module logic	2A at U_L
Maximum additional current for supplying the analog terminals	0.5A at U_{ANA}
Maximum current consumption of the I/O modules	See chapter 5 and the module datasheets
Observe the logic current consumption of each device when configuring a VersaPoint station! The logic current consumption is indicated in chapter 5 and in each module data sheet. The current consumption can differ depending on the individual module. The permissible number of devices that can be connected depends on the specific station structure.	
Maximum current carrying capacity of the voltage jumpers U_{ANA}	0.5A
Maximum current carrying capacity of the voltage jumpers U_M , U_S (total current)	8A
Observe the current consumption of every device on the individual voltage jumpers when configuring a VersaPoint station! The logic current consumption is given in chapter 5 and in each module data sheet. The current consumption can differ depending on the individual module. If the maximum current carrying capacity of a voltage jumper (8A) is reached, a new power terminal must be used.	

Ambient Conditions

Ambient Conditions	
This table provides standard data for the VersaPoint product family. Please refer to the module data sheets for additional information.	
Regulations	Developed according to VDE 0160, UL 508
Ambient temperature Ambient temperature (operation) Ambient temperature (storage/transport)	-25°C to +55°C (-13°F to +131°F) -25°C to +85°C (-13°F to +185°F)
Operating Humidity	75% on average; 85% occasionally; (no condensation) Ranging from -25°C to +55°C (-13°F to +131°F) appropriate measures against increased humidity (> 85%) must be taken.
Storage Humidity	75% on average; 85% occasionally; (no condensation)
Degree of protection according to DIN 40050, IEC 60529	IP20
Degree of protection according to DIN 57106-1	Class 3
Air and creepage distances	According to IEC 60644/ IEC 60664A/ DIN VDE 0110: 1989-01 and DIN VDE 0160: 1988-05
Degree of pollution according to EN 50178	2; Condensation not permissible in operation.
Surge voltage class	II (low-level signal) III (power level)
Gases that endanger the functions (according to DIN 40046-36, DIN 40046-37)	
Sulphur dioxide (SO ₂)	Concentration 10 ± 0.3 ppm Ambient conditions - Temperature: 25°C (± 2°C) - Humidity: 75% (± 5%) - Test duration: 10 days
Hydrogen sulfide (H ₂ S)	Concentration 1 ± 0.3 ppm Ambient conditions - Temperature: 25°C (± 2°C) - Humidity: 75% (± 5%) - Test duration: 4 days

Mechanical Demands

Mechanical Demands	
Vibration test Sinusoidal vibrations according to IEC 60068-2-6	2g load, 2 hours for each space direction (Low-level signal) 2g load, 2 hours for each space direction (Power level)
Shock test according to IEC 60068-2-27	25g load for 11ms, half sinusoidal wave, three shocks in each space direction and orientation.

Noise Immunity Test

Noise Immunity Test	
Please refer to the module data sheets for additional information.	
<i>In Accordance with EN 50082-2</i>	
Electrostatic Discharge (ESD)	EN 61000-4-2 / IEC 61000-4-2 Criteria B, 4kV contact discharge, 8kV air discharge
Electromagnetic Fields	ENV50140 / ENV50204 Criteria A, Field Strength: 10V/m
Bursts	EN 61000-4-4 / IEC 61000-4-4 Criteria A, All Interfaces:2kV
Conducted Interference	ENV 50141, Criteria A, Test voltage 10V
<i>In Accordance with EN 50082-2</i>	
Noise Emission of the Housing	EN 5011, Class A

Electrical Specifications

7.5V Supply of the Bus Logic (UL)	
Nominal voltage	7.5V (converted from external 24VDC)
Ripple	± 5%
Load current	2A, maximum
Connection	Voltage jumpers on the sides
Remark	Voltage is produced in the NIU by a DC/DC converter from the 24V supply voltage. UL is not electrically isolated from the 24V NIU voltage. UL is not electrically isolated from I/O voltages UM and US . Communications power UL is electronically short-circuit protected.

Supply of Terminals for Digital Signals (UM , US) in the 24V Range	
Nominal voltage	24VDC
Tolerance	- 15% / + 20%
Ripple	± 5%
Permissible voltage range	19.2VDC to 30.0VDC, ripple included
Load current	8A, maximum
Connection	Voltage jumpers on the sides of the module housing.
Remarks	Segment circuit US: All digital outputs and initiator supplies without individual short-circuit protection are connected to the segment circuit US. Main circuit UM: Initiator supplies with individual short-circuit protection are connected to the main circuit UM.

Supply of Terminals for Analog Signals (UANA)	
Nominal voltage	24VDC
Tolerance	- 15% / + 20%
Ripple	± 5%
Permissible voltage range	19.2VDC to 30.0VDC, ripple included
Load current	500mA, maximum
Connection	Voltage jumpers on the sides
Remarks	Isolation of the 24V input voltage by means of a diode. Smoothing through π -filter; corner frequency 9.8 kHz and attenuation of 40 dB/decade. UANA is not electrically isolated from the 24V bus module supply and the 7.5V communications power.

Voltage Dips and Interrupts of the I/O Supply	
Intensity PS1	Interruption time < 1 ms
Time interval between voltage dips	< 1 s
Behavior	Evaluation criterion 1 A < 1 ms supply voltage dip is not registered by the bus.
Intensity PS2	Interruption time < 10 ms
Time interval between voltage dips	< 1 s
Behavior	Evaluation criterion 3: Bus disconnection; all outputs of the system are reset.

Cables

Connection Type/Cable Diameter	
Connection type of cables	Spring-clamp terminals
Cable diameter low level signals (typical)	0.2mm ² up to 1.5mm ² (24 to 16 AWG)
Cable diameter low level signals (connection of equalizing conductors for thermocouples to the IC220ALG630 module)	0.13mm ² up to 1.5mm ² (26 to 16 AWG)
Cable diameter power level (Power terminal, motor connection, brake connection)	0.2mm ² up to 2.5mm ² (24 to 14 AWG) (Flexible and inflexible cables)
Cable diameter power level (Manual mode)	0.14mm ² up to 1.5mm ² (26 to 16 AWG) (Flexible and inflexible cables)

I/O Modules

Parameters of the I/O Modules		
Parameter	Minimum value	Maximum value
Digital I/O modules		
Input/output voltage	18.2VDC	253VAC
Input/output current	0.1mA	5A
Analog I/O modules		
Input/output voltage	0V	30V
Input/output current	0A	20mA

Air and Creepage Distances

<i>Air and Creepage Distances (According to EN 50178, VDE 0109, VDE 0110)</i>			
<i>Isolating Distance</i>	<i>Air Distance</i>	<i>Creepage Distance</i>	<i>Rated Withstand Voltage</i>
<i>Technology for 24V range</i>			
Incoming bus / bus logic	0.3mm	0.3mm	0.5kV
Outgoing bus / bus logic	0.3mm	0.3mm	0.5kV
Incoming bus / outgoing bus	0.3mm	0.3mm	0.5kV
Bus logic / I/O devices	0.3mm	0.3mm	0.5kV
<i>Technology for range up to 250VDC</i>			
Bus logic / I/O devices	3.1mm	1.1mm	4kV
<i>Technology for 230VAC range single-phase (up to 253VAC)</i>			
Bus logic / I/O devices	3.1mm	1.1mm	4kV
<i>Relay outputs</i>			
Main contact / N/O contact	See module-specific data sheet.		
Relay contact / bus logic	See module-specific data sheet.		

Test Voltages

Test Voltages	
Isolating distance	Test voltage
<i>Technology for 24V range (up to 60VDC)</i>	
5 V supply incoming network cable / 5 V supply outgoing network cable	500VAC, 50Hz, 1 min.
5 V supply incoming network cable / 7.5 V communications power, 24V NIU supply	500VAC, 50Hz, 1 min.
5 V supply incoming network cable / 24V main supply, 24V segment supply	500VAC, 50Hz, 1 min.
5 V supply incoming network cable / Functional earth ground	500VAC, 50Hz, 1 min.
5 V supply outgoing network cable / 7.5 V communications power, 24V NIU supply	500VAC, 50Hz, 1 min.
5 V supply outgoing network cable / 24V main supply, 24V segment supply	500VAC, 50Hz, 1 min.
5 V supply outgoing network cable / Functional earth ground	500VAC, 50Hz, 1 min.
7.5 V communications power, 24V NIU supply Functional / earth ground	500VAC, 50Hz, 1 min.
7.5 V communications power, 24V NIU supply / 24V main supply, 24V segment supply	500VAC, 50Hz, 1 min.
24V main supply, 24V segment supply Functional earth ground	500VAC, 50Hz, 1 min.
<i>Technology for range up to 250VDC</i>	
Bus logic / I/O devices	2500VAC, 50Hz, 1 min.
<i>Technology for 230VAC range single-phase (up to 253VAC)</i>	
Bus logic / I/O devices	2500VAC, 50Hz, 1 min.
<i>Relay outputs</i>	
Main contact / N/O contact	1000VAC, 50Hz, 1 min.
Relay contact / bus logic	2500VAC, 50Hz, 1 min.



Appendix *B*

Glossary

This section provides reference definitions for many of the terms used elsewhere in this manual.

1-wire termination Wire termination method for I/O modules with one termination connection per point. This conductor transfers the signal. I/O module and sensor or actuator must have the same potential.

2-wire termination Wire termination method for I/O modules with two termination connections per point. One conductor transfers the signal and the other the shared potential.

3-wire termination Wire termination method for I/O modules with three termination connections per point. One conductor transfers the signal, one the shared potential, and the third one another shared potential (for instance, shield or earth ground).

4-wire termination Wire termination method for I/O modules with four termination connections per point. One conductor transfers the signal, one the shared potential, and the third and fourth are intended for shield and ground connection.

Actuator An actuator is a device that can influence the behavior of a process and thereby cause a change in the process variables. Actuators are, for example, lamps, switches, etc.

Address The address defines a certain memory location. Data can be written to this location or read when the memory location is accessed.

Analog input An analog input is an input for receiving analog signals.

Analog output An analog output is an output that makes analog signals available.

Connector The connector is snapped onto the electronics base of the VersaPoint module.

Connector coding/ keying With VersaPoint you can prevent the mismating of connectors by encoding/ keying the base and the connector.

Cycle time The cycle time is the time the system needs to read all data from the connected devices and to write data to all connected devices.

Diagnostic LEDs Diagnostic LEDs provide information on the status of the station.

Electrical isolation Electrical isolation means that the circuits of an electrical device are galvanically separated from each other.

End clamp In a VersaPoint station, the end clamps are placed on the mounting rail on the left-side of the bus interface unit module and after the last module to prevent the module from sliding side ways.

End plate The end plate terminates a VersaPoint station. It has no electrical function. It protects the station against ESD pulses and the user against

dangerous contact voltage. The end plate is supplied together with the bus terminal and does not need to be ordered separately.

FE functional earth ground

Full duplex Simultaneous sending and receiving of data.

Functional earth ground A low impedance path between electrical circuits and earth for non-safety purposes such as noise immunity improvement.

Host system A control or computer system.

In process data Data which is transmitted from a device to an application program is IN process data for this application program.

Input Connection point of a circuit or a device where a signal to be processed, amplified, stored or linked with other signals can be connected .

Input address area The input address area is an area in which the devices store their data for the control system.

Input data Input data is data that is transmitted from a device to an application program.

I/O circuit The I/O circuit (Us+, Us-) begins at the NIU and is carried through all subsequent modules until the next power terminal. It supplies all modules that do not need to be isolated from the I/O voltage.

I/O module I/O modules connect to the sensors and actuators.

Logic circuit All connected modules are supplied through the logic circuit with communications power This circuit starts at the NIU and is carried through all VersaPoint modules.

Main circuit The main circuit supplies the VersaPoint station with the main power (UM). The main circuit starts at the NIU or power terminal and is led to the next power terminal.

Master The master is a central device which controls the bus access. All other devices operate as slaves.

Network A network is a communications link that connects devices together. The link operates under a protocol understood by all devices.

Out process data Data which an application program sends to a device is OUT process data for this application program.

Output address area The output address is an area in which the control system stores data which is to be transmitted to the devices.

Potential routing The potentials are routed over an electrical contact in a VersaPoint station that is automatically established when the terminals are properly installed on the mounting rail.

Power-level terminal Power-level terminals are used to switch single-phase or multi-phase power actuators (e.g., motors or lighting).

Power terminal The power terminal is a supply terminal. It supplies the main voltage to the station-internal voltage jumper. In addition to the main voltage, the segment voltage may be supplied or tapped off from the main voltage. Several power terminals can be used in a VersaPoint station. It realizes the electrical isolation between the different current circuits and permits areas with different voltages within the station (e.g., 24VDC and 230VAC).

Protocol A protocol is a set of conventions. It defines data formats and control procedures for communication between devices and processes.

Segment circuit The segment circuit or auxiliary circuit supplies the VersaPoint station modules with the segment voltage (U_s). The segment circuit starts at the NIU or at a supply terminal (power terminal or segment terminal) and is led through all modules to the supply terminal. It is used to create isolated circuits within the station.

Segment terminal The segment terminal is a supply terminal and is used to create a subcircuit (Segment circuit).

Sensor A sensor is a device that records the physical quantities of a process. The sensor determines the process variables.

Supply terminal Supply terminals in a VersaPoint system are power terminals and segment terminals.

Supply voltage A specific value to be given in volts.

Voltage supply All components used to generate and transmit the supply voltage.

Appendix *C*

Output Module Derating

This section describes how to find:

- Whether there is a derating on an output module at a specific ambient temperature
- The permissible operating temperature range for an output module

Power Loss of the Housing Within the Operating Temperature Range Depending on the Ambient Temperature

An example is calculated using the IC220MDL721 module.

Formula to calculate the power loss of the electronics

$$P_{\text{tot}} = 0.18 \text{ W} + \sum_{n=0}^2 (200 \text{ mW} + I_{L_n}^2 \times 0.1 \Omega)$$

This formula is terminal-specific and is indicated in every data sheet.

With

P_{tot} Total power loss of the terminal

n Index of the number of set outputs $n = 0$ to 2

I_{L_n} Load current of the output n

Example: Both outputs are connected and carry full load. The load currents of the outputs are $I_{L1} = I_{L2} = 2\text{A}$.

Power Loss of the Electronics

Referring to the formula, the electronics of this specific configuration has the following power loss:

$$P_{\text{tot}} = 0.18\text{W} + 2 \times [0.20\text{W} + (2\text{A})^2 \times 0.1\Omega]$$

$$P_{\text{tot}} = 0.18\text{W} + 2 \times 0.6\text{W}$$

$$P_{\text{tot}} = 0.18\text{W} + 1.2\text{W}$$

$$P_{\text{tot}} = 1.38\text{W}$$

Power Loss of the Housing

The value for the power loss of the housing is indicated in the terminal-specific data sheet. The permissible power loss of the housing for the IC220MDL721 module depends on the temperature.

$$P_{\text{HOU}} = 2.4\text{W} \quad -25^{\circ}\text{C} < T_{\text{U}} \leq -5^{\circ}\text{C}$$

$$P_{\text{HOU}} = 2.4\text{W} - [(T_{\text{U}} - (-5^{\circ}\text{C})) / 37.5 \text{ K/W}] \quad -5^{\circ}\text{C} < T_{\text{U}} \leq 55^{\circ}\text{C}$$

With

P_{HOU} Power loss of the housing

T_{U} Ambient temperature

With an ambient temperature of up to -5°C (23°F), you can load both outputs with 2A because $P_{\text{tot}} > P_{\text{HOU}}$.



Permissible Operating Temperature Range

With an increased ambient temperature, you must calculate the permissible operating temperature range for the calculated power loss.

Set $P_{tot} = P_{HOU}$.

$$P_{tot} = 2.4W - [(T_U + 5^{\circ}C) / 37.5K/W]$$

After changing the formula, the maximum permissible ambient temperature is calculated with this load as:

$$T_U = (2.4W - P_{tot}) \times 37.5K/W - 5^{\circ}C$$

$P_{tot} = 1.38W$ (from the calculated power loss of the electronics)

$$T_U = (2.4W - 1.38W) \times 37.5K/W - 5^{\circ}C$$

$$T_U = 1.02W \times 37.5K/W - 5^{\circ}C$$

$$T_U = 33.25^{\circ}C$$

With full load on both outputs, you can operate this module up to an ambient temperature of $33^{\circ}C$ ($91.4^{\circ}F$). If you never operate the outputs simultaneously and if a set output consumes a current of 2A you can operate the module up to:

$$P_{tot} = 0.18W + 1 \times [0.20W + (2A)^2 \times 0.1\Omega]$$

$$P_{tot} = 0.18W + 0.60W$$

$$P_{tot} = 0.78W$$

$$T_U = (2.4W - P_{tot}) \times 37.5K/W - 5^{\circ}C$$

$P_{tot} = 0.78W$ (from the calculated power loss of the electronics)

$$T_U = (2.4W - 0.78W) \times 37.5K/W - 5^{\circ}C$$

$$T_U = 1.62W \times 37.5K/W - 5^{\circ}C$$

$$T_U = 55.75^{\circ}C$$

$$T_U = 55^{\circ}C \text{ (maximum permissible ambient temperature)}$$

As the maximum permissible ambient temperature is $55^{\circ}C$ ($131^{\circ}F$) you can work in the entire permissible temperature range under the above mentioned conditions. This leads to a simultaneity of 50% at $55^{\circ}C$ indicated in the data sheet.

Appendix *D*

The NIU GSD File

This appendix shows the contents of the GSD files for VersaPoint Profibus Network Interface Units IC200PBI002 and PBI001 at the time this manual was complete. These files are included only for reference; an electronic version of the GSD files is provided with each NIU.

- GSD file for NIU Version IC220PBI002 (DIP with 8 on On position). At the time this manual was released, this file was named: Gef_06CC.gsd
- GSD file for NIU version IC220PBI002 (DIP switch 8 in Off position) or for NIU version IC220PBI001. At the time this manual was released, this file was named: Gef_05b9.gsd



GSD File for NIU Version IC220PBI002

Use this file for NIU version module IC220PBI002 when DIP switch 8 is in the On position. See chapter 4 for more information about setting this switch.

```
.*****
;
; GSD-File for VersaPoint PROFIBUS-DP NETWORK
INTERFACE UNIT
; Article-No. : IC220PBI002-AA (usage with DIP8 = ON)
; Hardware-Release : 02
; Firmware-Release : A (41 hex)
; GSD-Revision : 1.01
; Date : 18.12.2002
.*****
; ***** Changes *****
;
; Date Change
; 02.10.2002 First Release
; 18.12.2002 DP-V1 Entries added
.*****

#Profibus_DP
GSD_REVISION = 3 ; version ID of the GSD file
format
Vendor_Name = "GE" ; manufacturer name
Model_Name = "IC220PBI002-AA (DIP8=ON)" ; device name
Revision = "V2.0" ; device revision
Ident_Number = 0x06CC ; product ID
Slave_Family = 3@GE@VersaPoint; device family class
Protocol_Ident = 0 ; protocol ID of the device
Station_Type = 0 ; device type
FMS_supp = 0 ; no DP/FMS mixed device
Hardware_Release = "V2.0" ; hardware revision
Software_Release = "A" ; software revision
Bitmap_Device = "GEF06CCn" ; device bitmap - normal
state
;Bitmap_DIAG = "GEF06CCd" ; device bitmap -
diagnostic state

9.6_supp = 1 ; supported baudrates
19.2_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1

MaxTsdr_9.6 = 60 ; device respond times
MaxTsdr_19.2 = 60
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150
MaxTsdr_3M = 250
MaxTsdr_6M = 550
MaxTsdr_12M = 850

Redundancy = 0 ; no redundancy
Repeater_Ctrl_Sig = 2 ; RTS available

Modul_Offset = 0 ; 1. Slot number for HW config
tool

DPV1_Slave = 1
C1_Read_Write_supp = 1
C1_Response_Timeout = 1000
C1_Max_Data_Len = 72
C2_Max_Count_Channels = 1
C2_Read_Write_supp = 1
C2_Response_Timeout = 1000
C2_Max_Data_Len = 72
Max_initiate_PDU_Length = 64
DPV1_Data_Types = 1

.*****
; ***** modular device *****
; *****
;
Modular_Station = 1 ; modular device
Max_Module = 63 ; max 63 modules
Max_Input_Len = 176 ; max 176 Byte input data
Max_Output_Len = 176 ; max 176 Byte output data
Max_Data_Len = 176 ; max sum: 176 Byte input and
output data

.*****
; ***** Parameter Text Definitions *****
; *****
;
*
```

Grounding

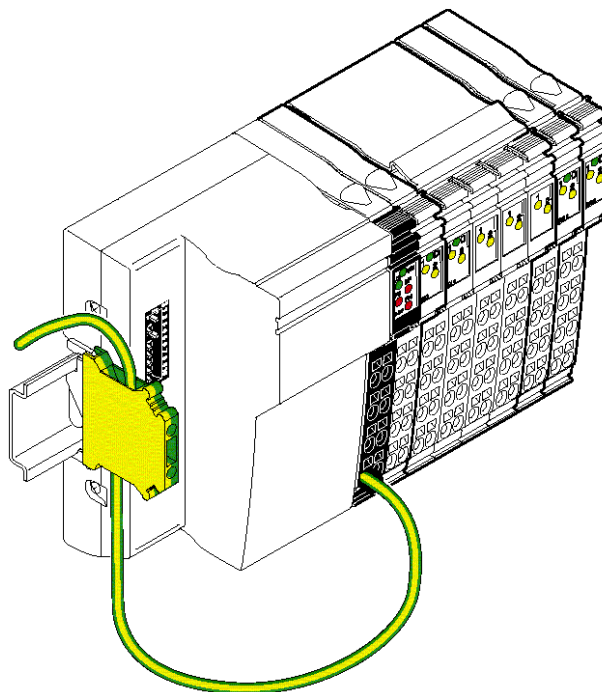
All devices in a VersaPoint station must be grounded so that possible signal interference is shielded and discharged to ground. A wire of at least 1.5mm^2 (16 AWG) must be used for grounding.

Grounding the NIU and Power Modules

The NIU, power terminals, and segment terminals have an FE spring (metal clip) on the bottom of the electronics base. These springs create an electric connection to the DIN rail. VersaPoint I/O modules are automatically grounded via the FE voltage jumper when they are connected to other modules. The FE voltage jumper (functional earth ground) runs from the NIU through the entire VersaPoint station. The function of FE is to discharge interference. It does not provide shock protection.

Required Additional Grounding

To ensure a reliable ground connection even if the DIN rail is dirty or the metal clip damaged, GE Intelligent Platforms recommends grounding the NIU to a DIN rail-mounted grounding terminal block, via the FE terminal point.





Text(11)= "reserved"
Text(12)= "reserved"
Text(13)= "Potentiometer [%]"
Text(14)= "linear R: 0 up to 400 Ohm"
Text(15)= "linear R: up 4000 Ohm"
EndPrmText

PrmText = 15
Text(0) = "with compensation"
Text(1) = "compensation deactivated"
EndPrmText

PrmText = 17
Text(192) = "0.20 A"
Text(193) = "0.25 A"
Text(194) = "0.30 A"
Text(195) = "0.35 A"
Text(196) = "0.40 A"
Text(197) = "0.45 A"
Text(198) = "0.50 A"
Text(199) = "0.55 A"
Text(200) = "0.60 A"
Text(201) = "0.65 A"
Text(202) = "0.70 A"
Text(203) = "0.75 A"
Text(204) = "0.80 A"
Text(205) = "0.85 A"
Text(206) = "0.90 A"
Text(207) = "0.95 A"
Text(208) = "1.00 A"
Text(209) = "1.05 A"
Text(210) = "1.10 A"
Text(211) = "1.15 A"
Text(212) = "1.20 A"
Text(213) = "1.30 A"
Text(214) = "1.40 A"
Text(215) = "1.50 A"
Text(216) = "1.60 A"
Text(217) = "1.70 A"
Text(218) = "1.80 A"
Text(219) = "1.90 A"
Text(220) = "2.00 A"
Text(221) = "2.10 A"
Text(222) = "2.20 A"
Text(223) = "2.30 A"
Text(224) = "2.40 A"
Text(225) = "2.50 A"
Text(226) = "2.60 A"

Text(227) = "2.70 A"
Text(228) = "2.80 A"
Text(229) = "2.90 A"
Text(230) = "3.00 A"
Text(231) = "3.20 A"
Text(232) = "3.40 A"
Text(233) = "3.60 A"
EndPrmText

PrmText = 18
Text(192) = "0.20 A"
Text(193) = "0.25 A"
Text(194) = "0.30 A"
Text(195) = "0.35 A"
Text(196) = "0.40 A"
Text(197) = "0.45 A"
Text(198) = "0.50 A"
Text(199) = "0.55 A"
Text(200) = "0.60 A"
Text(201) = "0.65 A"
Text(202) = "0.70 A"
Text(203) = "0.75 A"
Text(204) = "0.80 A"
Text(205) = "0.85 A"
Text(206) = "0.90 A"
Text(207) = "0.95 A"
Text(208) = "1.00 A"
Text(209) = "1.05 A"
Text(210) = "1.10 A"
Text(211) = "1.15 A"
Text(212) = "1.20 A"
Text(213) = "1.30 A"
Text(214) = "1.40 A"
Text(215) = "1.50 A"
Text(216) = "1.60 A"
Text(217) = "1.70 A"
Text(218) = "1.80 A"
Text(219) = "1.90 A"
Text(220) = "2.00 A"
Text(221) = "2.10 A"
Text(222) = "2.20 A"
Text(223) = "2.30 A"
Text(224) = "2.40 A"
Text(225) = "2.50 A"
Text(226) = "2.60 A"
Text(227) = "2.70 A"
Text(228) = "2.80 A"
Text(229) = "2.90 A"
Text(230) = "3.00 A"

<pre> Text(231) = "3.20 A" Text(232) = "3.40 A" Text(233) = "3.60 A" Text(234) = "3.80 A" Text(235) = "4.00 A" Text(236) = "4.20 A" Text(237) = "4.40 A" Text(238) = "4.60 A" Text(239) = "4.80 A" Text(240) = "5.00 A" Text(241) = "5.20 A" Text(242) = "5.40 A" Text(243) = "5.60 A" Text(244) = "5.80 A" Text(245) = "6.00 A" Text(246) = "6.20 A" Text(247) = "6.40 A" Text(248) = "6.60 A" Text(249) = "6.80 A" Text(250) = "7.00 A" Text(251) = "7.20 A" Text(252) = "7.40 A" Text(253) = "7.60 A" Text(254) = "7.80 A" Text(255) = "8.00 A" EndPrmText PrmText = 19 Text(0) = "Local Bus: Run" Text(1) = "Local Bus: Stop" EndPrmText PrmText = 20 Text(0) = "automatically" Text(1) = "manually" EndPrmText PrmText = 21 Text(0) = "Status-PDU" Text(1) = "Identifier related" Text(2) = "VersaPoint Profibus NIU Format" EndPrmText PrmText = 22 Text(1) = "Output: 0" Text(2) = "Hold last Value" Text(3) = "Switch replacement value" EndPrmText </pre>	<pre> PrmText = 23 Text(0) = "0" Text(1) = "1" EndPrmText PrmText = 24 Text(0) = "16 Values" Text(1) = "mean value deactivated" Text(2) = "4 Values" Text(3) = "32 Values" EndPrmText PrmText = 25 Text(0) = "0 V - 10 V" Text(1) = "+/-10 V" Text(2) = "0 V - 5 V" Text(3) = "+/-5 V" Text(4) = "0 V - 25 V" Text(5) = "+/-25 V" Text(6) = "0 V - 50 V" Text(7) = "reserved" Text(8) = "0 mA - 20 mA" Text(9) = "+/-20 mA" Text(10) = "4 mA - 20 mA" Text(11) = "reserved" Text(12) = "0 mA - 40 mA" Text(13) = "+/-40 mA" EndPrmText PrmText = 26 Text(0) = "Byte 0-1 = Plug 4/3-2/1" Text(1) = "Byte 0-1 = Plug 2/1-4/3" EndPrmText PrmText = 27 Text(0) = "On Global Control 'Operate' only" Text(1) = "Without Global Control 'Operate'" EndPrmText PrmText = 29 Text(0) = "Transparent" Text(1) = "End to End" Text(2) = "Dual Buffer" Text(3) = "3964R" Text(4) = "XON/XOFF" EndPrmText </pre>
--	--



```
PrmText = 30
Text(0) = "110"
Text(1) = "300"
Text(2) = "300"
Text(3) = "1200"
Text(4) = "1800"
Text(5) = "2400"
Text(6) = "4800"
Text(7) = "9600"
Text(8) = "19200"
Text(9) = "38400"
EndPrmText
```

```
PrmText = 31
Text(0) = "7 data + 1 stop bit, even parity"
Text(1) = "7 data + 1 stop bit, odd parity"
Text(2) = "8 data + 1 stop bit, even parity"
Text(3) = "8 data + 1 stop bit, odd parity"
Text(4) = "8 data + 1 stop bit, no parity"
Text(5) = "7 data + 1 stop bit, no parity"
Text(6) = "7 data + 1 stop bit, even parity"
Text(7) = "7 data + 2 stop bit, odd parity"
Text(8) = "8 data + 2 stop bit, even parity"
Text(9) = "8 data + 2 stop bit, odd parity"
Text(10) = "8 data + 2 stop bit, no parity"
Text(11) = "7 data + 2 stop bit, no parity"
EndPrmText
```

```
PrmText = 32
Text(0) = "Low Priority"
Text(1) = "High Priority"
EndPrmText
```

```
PrmText = 33
Text(0) = "automatic"
Text(1) = "via process data"
EndPrmText
```

```
PrmText = 34
Text(0) = "No rotation"
Text(1) = "Rotation"
EndPrmText
```

```
PrmText = 35
Text(0) = "Invalid"
Text(1) = "RS-485"
Text(2) = "RS-422"
```

EndPrmText

```
.*****
,*** Parameter Data Options and Positions *****
,*****
```

```
ExtUserPrmData = 1 "Configuration Channel 1"
Bit(7) 0 0-1
Prm_Text_Ref = 1
EndExtUserPrmData
```

```
ExtUserPrmData = 2 "Filter Channel 1"
BitArea(0-1) 0 0-1
Prm_Text_Ref = 2
EndExtUserPrmData
```

```
ExtUserPrmData = 3 "Format Channel 1"
BitArea(4-5) 0 0-3
Prm_Text_Ref = 3
EndExtUserPrmData
```

```
ExtUserPrmData = 4 "Measuring Range Channel 1"
BitArea(0-3) 0 0,1,8,9,10
Prm_Text_Ref = 4
EndExtUserPrmData
```

```
ExtUserPrmData = 5 "Configuration Channel 2"
Bit(7) 0 0-1
Prm_Text_Ref = 1
EndExtUserPrmData
```

```
ExtUserPrmData = 6 "Filter Channel 2"
BitArea(0-1) 0 0-1
Prm_Text_Ref = 2
EndExtUserPrmData
```

```
ExtUserPrmData = 7 "Format Channel 2"
BitArea(4-5) 0 0-3
Prm_Text_Ref = 3
EndExtUserPrmData
```

```
ExtUserPrmData = 8 "Measuring Range Channel 2"
BitArea(0-3) 0 0,1,8,9,10
Prm_Text_Ref = 4
EndExtUserPrmData
```

```
ExtUserPrmData = 9 "Resolution Channel 1"
BitArea(6-7) 0 0-3
Prm_Text_Ref = 5
```

EndExtUserPrmData	BitArea(4-5) 0 0-3 Prm_Text_Ref = 7 EndExtUserPrmData
ExtUserPrmData = 10 "Format Channel 1"	
BitArea(4-5) 0 0-2 Prm_Text_Ref = 3 EndExtUserPrmData	ExtUserPrmData = 20 "R0 Channel 2"
	BitArea(0-3) 0 0-15 Prm_Text_Ref = 8 EndExtUserPrmData
ExtUserPrmData = 11 "Sensor Type Channel 1"	
BitArea(0-3) 0 0-14 Prm_Text_Ref = 6 EndExtUserPrmData	ExtUserPrmData = 21 "Resolution Sensor Channel 2"
	BitArea(6-7) 0 0-3 Prm_Text_Ref = 9 EndExtUserPrmData
ExtUserPrmData = 12 "Resolution Channel 2"	
BitArea(6-7) 0 0-3 Prm_Text_Ref = 5 EndExtUserPrmData	ExtUserPrmData = 22 "Sensor Type Channel 2"
	BitArea(0-3) 0 0-15 Prm_Text_Ref = 10 EndExtUserPrmData
ExtUserPrmData = 13 "Format Channel 2"	
BitArea(4-5) 0 0-2 Prm_Text_Ref = 3 EndExtUserPrmData	
	ExtUserPrmData = 29 "Compensation Channel 1"
ExtUserPrmData = 14 "Sensor Type Channel 2"	Bit(0) 0 0-1 Prm_Text_Ref = 15 EndExtUserPrmData
BitArea(0-3) 0 0-14 Prm_Text_Ref = 6 EndExtUserPrmData	
	ExtUserPrmData = 33 "Compensation Channel 2"
ExtUserPrmData = 15 "Connection Type Channel 1"	Bit(0) 0 0-1 Prm_Text_Ref = 15 EndExtUserPrmData
BitArea(4-5) 0 0-3 Prm_Text_Ref = 7 EndExtUserPrmData	
	ExtUserPrmData = 35 "Nominal Current"
ExtUserPrmData = 16 "R0 Channel 1"	BitArea(0-7) 192 192-233 Prm_Text_Ref = 17 EndExtUserPrmData
BitArea(0-3) 0 0-15 Prm_Text_Ref = 8 EndExtUserPrmData	
	ExtUserPrmData = 36 "Nominal Current"
ExtUserPrmData = 17 "Resolution Sensor Channel 1"	BitArea(0-7) 192 192-255 Prm_Text_Ref = 18 EndExtUserPrmData
BitArea(6-7) 0 0-3 Prm_Text_Ref = 9 EndExtUserPrmData	
	ExtUserPrmData = 37 "Station Behaviour on Errors"
ExtUserPrmData = 18 "Sensor Type Channel 1"	Bit(0) 0 0-1 Prm_Text_Ref = 19 EndExtUserPrmData
BitArea(0-3) 0 0-15 Prm_Text_Ref = 10 EndExtUserPrmData	
	ExtUserPrmData = 38 "Acknowledge of peripheral Faults"
ExtUserPrmData = 19 "Connection Type Channel 2"	Bit(1) 0 0-1



Prm_Text_Ref = 20 EndExtUserPrmData	EndExtUserPrmData
ExtUserPrmData = 39 "Diagnostics Format" BitArea(2-3) 0 0-2 Prm_Text_Ref = 21 EndExtUserPrmData	ExtUserPrmData = 49 "Replacement Value Byte 0 Bit 2" Bit(2) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 40 "Error Behaviour" BitArea(2-3) 1 1-3 Prm_Text_Ref = 22 EndExtUserPrmData	ExtUserPrmData = 50 "Replacement Value Byte 0 Bit 3" Bit(3) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 41 "Error Behaviour packed Module 1" BitArea(2-3) 1 1-3 Prm_Text_Ref = 22 EndExtUserPrmData	ExtUserPrmData = 51 "Replacement Value Byte 0 Bit 4" Bit(4) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 42 "Error Behaviour packed Module 2" BitArea(2-3) 1 1-3 Prm_Text_Ref = 22 EndExtUserPrmData	ExtUserPrmData = 52 "Replacement Value Byte 0 Bit 5" Bit(5) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 43 "Error Behaviour packed Module 3" BitArea(2-3) 1 1-3 Prm_Text_Ref = 22 EndExtUserPrmData	ExtUserPrmData = 53 "Replacement Value Byte 0 Bit 6" Bit(6) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 44 "Error Behaviour packed Module 4" BitArea(2-3) 1 1-3 Prm_Text_Ref = 22 EndExtUserPrmData	ExtUserPrmData = 54 "Replacement Value Byte 0 Bit 7" Bit(7) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 45 "Replacement Value Channel 1" Signed16 0 -32768-32767 EndExtUserPrmData	ExtUserPrmData = 55 "Replacement Value Byte 1 Bit 0" Bit(0) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 46 "Replacement Value Channel 2" Signed16 0 -32768-32767 EndExtUserPrmData	ExtUserPrmData = 56 "Replacement Value Byte 1 Bit 1" Bit(1) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 47 "Replacement Value Byte 0 Bit 0" Bit(0) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData	ExtUserPrmData = 57 "Replacement Value Byte 1 Bit 2" Bit(2) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 48 "Replacement Value Byte 0 Bit 1" Bit(1) 0 0-1 Prm_Text_Ref = 23	ExtUserPrmData = 58 "Replacement Value Byte 1 Bit 3" Bit(3) 0 0-1

Prm_Text_Ref = 23	ExtUserPrmData = 68 "Replacement Value M2 - CH2"
EndExtUserPrmData	Bit(1) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 59 "Replacement Value Byte 1 Bit 4"	
Bit(4) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 69 "Replacement Value M2 - CH3"
EndExtUserPrmData	Bit(2) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 60 "Replacement Value Byte 1 Bit 5"	
Bit(5) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 70 "Replacement Value M2 - CH4"
EndExtUserPrmData	Bit(3) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 61 "Replacement Value Byte 1 Bit 6"	
Bit(6) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 71 "Replacement Value M3 - CH1"
EndExtUserPrmData	Bit(0) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 62 "Replacement Value Byte 1 Bit 7"	
Bit(7) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 72 "Replacement Value M3 - CH2"
EndExtUserPrmData	Bit(1) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 63 "Replacement Value M1 - CH1"	
Bit(0) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 73 "Replacement Value M4 - CH1"
EndExtUserPrmData	Bit(0) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 64 "Replacement Value M1 - CH2"	
Bit(1) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 74 "Replacement Value M4 - CH2"
EndExtUserPrmData	Bit(1) 0 0-1
	Prm_Text_Ref = 23
	EndExtUserPrmData
ExtUserPrmData = 65 "Replacement Value M1 - CH3"	
Bit(2) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 75 "Filter"
EndExtUserPrmData	BitArea(0-1) 0 0-3
	Prm_Text_Ref = 24
	EndExtUserPrmData
ExtUserPrmData = 66 "Replacement Value M1 - CH4"	
Bit(3) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 76 "Measure Range"
EndExtUserPrmData	BitArea(0-3) 0 0-13
	Prm_Text_Ref = 25
	EndExtUserPrmData
ExtUserPrmData = 67 "Replacement Value M2 - CH1"	
Bit(0) 0 0-1	
Prm_Text_Ref = 23	ExtUserPrmData = 77 "Format"
EndExtUserPrmData	BitArea(4-6) 0 0-4
	Prm_Text_Ref = 3



EndExtUserPrmData	Unsigned8 0 0-1 Prm_Text_Ref=33 EndExtUserPrmData
ExtUserPrmData = 81 "IN/OUT 16PT Byte Position" Bit(4) 0 0-1 Prm_Text_Ref = 26 EndExtUserPrmData	ExtUserPrmData = 95 "Rotation Switch" Unsigned8 0 0-1 Prm_Text_Ref = 34 EndExtUserPrmData
ExtUserPrmData = 82 "Data Exchange Mode" Bit(5) 0 0-1 Prm_Text_Ref = 27 EndExtUserPrmData	ExtUserPrmData = 96 "XON Pattern" Unsigned8 17 0-127 EndExtUserPrmData
ExtUserPrmData = 86 "Replacement Value Channel 1" Unsigned16 0 0-65535 EndExtUserPrmData	ExtUserPrmData = 97 "XOFF Pattern" Unsigned8 19 0-127 EndExtUserPrmData
ExtUserPrmData = 87 "Protocol" Unsigned8 0 0-4 Prm_Text_Ref = 29 EndExtUserPrmData	ExtUserPrmData = 98 "Output Type" Unsigned8 1 0-2 Prm_Text_Ref = 35 EndExtUserPrmData
ExtUserPrmData = 88 "Baudrate" Unsigned8 7 0-9 Prm_Text_Ref = 30 EndExtUserPrmData	ExtUserPrmData = 99 "Replacement Value Channel 0" Bit(0) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 89 "Data width" Unsigned8 2 0-11 Prm_Text_Ref = 31 EndExtUserPrmData	ExtUserPrmData = 100 "Replacement Value Channel 1" Bit(1) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 90 "Error Pattern" Unsigned8 36 0-127 EndExtUserPrmData	ExtUserPrmData = 101 "Replacement Value Channel 2" Bit(2) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 91 "First Delimiter" Unsigned8 13 0-127 EndExtUserPrmData	ExtUserPrmData = 102 "Replacement Value Channel 3" Bit(3) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 92 "Second Delimiter" Unsigned8 10 0-127 EndExtUserPrmData	ExtUserPrmData = 103 "Replacement Value Channel 4" Bit(4) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData
ExtUserPrmData = 93 "3964R-Priorität" Unsigned8 0 0-1 Prm_Text_Ref = 32 EndExtUserPrmData	ExtUserPrmData = 104 "Replacement Value Channel 5" Bit(5) 0 0-1
ExtUserPrmData = 94 "DTR Control"	

<pre> Prm_Text_Ref = 23 EndExtUserPrmData ExtUserPrmData = 105 "Replacement Value Channel 6" Bit(6) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData ExtUserPrmData = 106 "Replacement Value Channel 7" Bit(7) 0 0-1 Prm_Text_Ref = 23 EndExtUserPrmData ExtUserPrmData = 118 "Format Channel 1" BitArea(4-5) 0 0-2 Prm_Text_Ref = 3 EndExtUserPrmData ExtUserPrmData = 119 "Format Channel 2" BitArea(4-5) 0 0-2 Prm_Text_Ref = 3 EndExtUserPrmData ExtUserPrmData = 122 "Error Behaviour" BitArea(2-3) 2 1-3 Prm_Text_Ref = 22 EndExtUserPrmData ;***** ;***** slave specific data ***** ;***** Freeze_Mode_supp = 1 ; device supports freeze mode Sync_Mode_supp = 1 ; device supports sync mode Auto_Baud_supp = 1 ; automatic baud rate recognition Min_Slave_Intervall = 2 ; min cycle time 0.2ms Max_Diag_Data_Len = 16 ; max length of diagnostic data Max_User_Prm_Data_Len = 168 ; length of User_Prm_Data Ext_User_Prm_Data_Const(0) = 0x80,0x00,0x00,0x00; 3 Byte for DPV1 and parameter telegram, ; 1 Byte for coupler parameter Ext_User_Prm_Data_Ref(3) = 37 Ext_User_Prm_Data_Ref(3) = 38 </pre>	<pre> Ext_User_Prm_Data_Ref(3) = 39 Ext_User_Prm_Data_Ref(3) = 81 Ext_User_Prm_Data_Ref(3) = 82 ;***** PD-PCP (VC1) ***** Module="PD-PCP 4 words" 0xF3 1 EndModule Module="PD-PCP 6 words" 0xF5 2 EndModule Module="PD-PCP 8 words" 0xF7 3 EndModule Module="PD-PCP 10 words" 0xF9 4 EndModule Module="PD-PCP 12 words" 0xFB 5 EndModule Module="PD-PCP 14 words" 0xFD 6 EndModule Module="PD-PCP 16 words" 0xFF 7 EndModule ;***** digital output modules ***** Module="IC220MDL930*OUT RELAY 3A 1PT" 0x82,0x00,0xBD,0xC2 8 Ext_Module_Prm_Data_Len = 3 Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00 Ext_User_Prm_Data_Ref(0) = 40 Ext_User_Prm_Data_Ref(2) = 99 EndModule Module="IC220MDL940*OUT RELAY 3A 4PT" 0x82,0x00,0xBD,0x41 </pre>
---	--

9

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
Ext_User_Prm_Data_Ref(2) = 101
Ext_User_Prm_Data_Ref(2) = 102
EndModule
```

```
Module="IC220MDL931*OUT RELAY 3A PC 1PT"
0x82,0x00,0xBD,0xC2
```

10

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
EndModule
```

```
Module="IC220MDL941*OUT RELAY 3A PC 4PT"
0x82,0x00,0xBD,0x41
```

11

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
Ext_User_Prm_Data_Ref(2) = 101
Ext_User_Prm_Data_Ref(2) = 102
EndModule
```

```
Module="IC220MDL350*OUT VAC 0.5A 1PT"
0x82,0x00,0xBD,0xC2
```

12

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
EndModule
```

```
Module="IC220MDL350*OUT 1A 4PT"
0x82,0x00,0xBD,0x41
```

13

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(1) = 99
Ext_User_Prm_Data_Ref(1) = 100
Ext_User_Prm_Data_Ref(1) = 101
Ext_User_Prm_Data_Ref(1) = 102
```

EndModule

```
Module="IC220MDL751*OUT 24VDC .5A 2PT"
0x82,0x00,0xBD,0xC2
```

14

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
EndModule
```

```
Module="IC220MDL721*OUT 24VDC 2A 2PT"
0x82,0x00,0xBD,0xC2
```

15

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
EndModule
```

```
Module="IC220MDL761*OUT 24VDC NEG 2PT"
0x82,0x00,0xBD,0xC2
```

16

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
EndModule
```

```
Module="IC220MDL771*OUT 24VDC DIAG 2PT"
0xC2,0x00,0x00,0xBF,0x41
```

17

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
EndModule
```

```
Module="IC220MDL752*OUT 24VDC .5A 4PT"
0x82,0x00,0xBD,0x41
```

18

```
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
```

```
Ext_User_Prm_Data_Ref(2) = 101
Ext_User_Prm_Data_Ref(2) = 102
EndModule
```

```
Module="IC220MDL753*OUT 24VDC .5A 8PT"
0x82,0x00,0xBD,0x81
19
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
Ext_User_Prm_Data_Ref(2) = 101
Ext_User_Prm_Data_Ref(2) = 102
Ext_User_Prm_Data_Ref(2) = 103
Ext_User_Prm_Data_Ref(2) = 104
Ext_User_Prm_Data_Ref(2) = 105
Ext_User_Prm_Data_Ref(2) = 106
EndModule
```

```
Module="IC220MDL723*OUT 24VDC 2A 8PT"
0x82,0x00,0xBD,0x81
20
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 99
Ext_User_Prm_Data_Ref(2) = 100
Ext_User_Prm_Data_Ref(2) = 101
Ext_User_Prm_Data_Ref(2) = 102
Ext_User_Prm_Data_Ref(2) = 103
Ext_User_Prm_Data_Ref(2) = 104
Ext_User_Prm_Data_Ref(2) = 105
Ext_User_Prm_Data_Ref(2) = 106
EndModule
```

```
Module="IC220MDL754*OUT 24VDC .5A 16PT"
0x82,0x01,0xBD,0x01
21
Ext_Module_Prm_Data_Len = 4
Ext_User_Prm_Data_Const(0) = 0x00,0x82,0x00,0x00
Ext_User_Prm_Data_Ref(0) = 40
Ext_User_Prm_Data_Ref(2) = 47
Ext_User_Prm_Data_Ref(2) = 48
Ext_User_Prm_Data_Ref(2) = 49
Ext_User_Prm_Data_Ref(2) = 50
Ext_User_Prm_Data_Ref(2) = 51
Ext_User_Prm_Data_Ref(2) = 52
Ext_User_Prm_Data_Ref(2) = 53
```

```
Ext_User_Prm_Data_Ref(2) = 54
Ext_User_Prm_Data_Ref(3) = 55
Ext_User_Prm_Data_Ref(3) = 56
Ext_User_Prm_Data_Ref(3) = 57
Ext_User_Prm_Data_Ref(3) = 58
Ext_User_Prm_Data_Ref(3) = 59
Ext_User_Prm_Data_Ref(3) = 60
Ext_User_Prm_Data_Ref(3) = 61
Ext_User_Prm_Data_Ref(3) = 62
EndModule
```

```
,***** digital output modules, packed *****
```

```
Module="OUT RELAY 3A 1PT (QTY.2) 4 Bit"
0x83,0x00,0xBD,0xC2,0x02
22
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
EndModule
```

```
Module="OUT RELAY 3A 1PT (QTY.3) 6 Bit"
0x83,0x00,0xBD,0xC2,0x03
23
Ext_Module_Prm_Data_Len = 9
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
EndModule
```

```
Module="OUT RELAY 3A 1PT (QTY.4) 8 Bit"
0x83,0x00,0xBD,0xC2,0x04
24
Ext_Module_Prm_Data_Len = 12
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0
x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
```

```
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
Ext_User_Prm_Data_Ref(9) = 44
Ext_User_Prm_Data_Ref(11) = 73
EndModule
```

```
Module="OUT RELAY PWR 1PT (QTY.2) 4 Bit"
0x83,0x00,0xBD,0xC2,0x02
25
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
EndModule
```

```
Module="OUT RELAY PWR 1PT (QTY.3) 6 Bit"
0x83,0x00,0xBD,0xC2,0x03
26
Ext_Module_Prm_Data_Len = 9
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
EndModule
```

```
Module="OUT RELAY PWR 1PT (QTY.4) 8 Bit"
0x83,0x00,0xBD,0xC2,0x04
27
Ext_Module_Prm_Data_Len = 12
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0
x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
Ext_User_Prm_Data_Ref(9) = 44
Ext_User_Prm_Data_Ref(11) = 73
EndModule
```

```
Module="OUT RELAY 3A 4PT (QTY.2) 8 Bit"
0x83,0x00,0xBD,0x41,0x02
28
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(2) = 65
Ext_User_Prm_Data_Ref(2) = 66
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
Ext_User_Prm_Data_Ref(5) = 69
Ext_User_Prm_Data_Ref(5) = 70
EndModule
```

```
Module="OUT RELAY PWR 4PT (QTY.2) 8 Bit"
0x83,0x00,0xBD,0x41,0x02
29
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(2) = 65
Ext_User_Prm_Data_Ref(2) = 66
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
Ext_User_Prm_Data_Ref(5) = 69
Ext_User_Prm_Data_Ref(5) = 70
EndModule
```

```
Module="OUT 24VDC POS 2PT (QTY.2) 4 Bit"
0x83,0x00,0xBD,0xC2,0x02
30
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
EndModule
```

```
Module="OUT 24VDC POS 2PT (QTY.3) 6 Bit"
0x83,0x00,0xBD,0xC2,0x03
```

```
31
```

```
Ext_Module_Prm_Data_Len = 9
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
Ext_User_Prm_Data_Ref(8) = 72
EndModule
```

```
Module="OUT 24VDC POS 2PT (QTY.4) 8 Bit"
0x83,0x00,0xBD,0xC2,0x04
```

```
32
```

```
Ext_Module_Prm_Data_Len = 12
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00,0x00,0x81,0x00,0x81,0
x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
Ext_User_Prm_Data_Ref(6) = 43
Ext_User_Prm_Data_Ref(8) = 71
Ext_User_Prm_Data_Ref(8) = 72
Ext_User_Prm_Data_Ref(9) = 44
Ext_User_Prm_Data_Ref(11) = 73
Ext_User_Prm_Data_Ref(11) = 74
EndModule
```

```
Module="OUT 24VDC POS 4PT (QTY.2) 8 Bit"
0x83,0x00,0xBD,0x41,0x02
```

```
33
```

```
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x00,0x81,0x00,0x00,0x81,0x00
Ext_User_Prm_Data_Ref(0) = 41
Ext_User_Prm_Data_Ref(2) = 63
Ext_User_Prm_Data_Ref(2) = 64
Ext_User_Prm_Data_Ref(2) = 65
Ext_User_Prm_Data_Ref(2) = 66
```

```
Ext_User_Prm_Data_Ref(3) = 42
Ext_User_Prm_Data_Ref(5) = 67
Ext_User_Prm_Data_Ref(5) = 68
Ext_User_Prm_Data_Ref(5) = 69
Ext_User_Prm_Data_Ref(5) = 70
EndModule
```

```
,***** digital input modules *****
```

```
Module="IC220MDL220*IN 120VAC 1PT"
0x42,0x00,0xBE,0xC2
```

```
34
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDL230*IN 230VAC 1PT"
0x42,0x00,0xBE,0xC2
```

```
35
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDL641*IN 24VDC 2PT"
0x42,0x00,0xBE,0xC2
```

```
36
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDL661*IN 24VDC NEG 2PT"
0x42,0x00,0xBE,0xC2
```

```
37
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDL651*IN 24VDC 2PT DESINA"
0x42,0x00,0xBE,0x41
```

```
38
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDL642*IN 24VDC 4PT"
0x42,0x00,0xBE,0x41
```

```
39
```

```
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
```



EndModule

Module="IC220MDL643*IN 24VDC 8PT"

0x42,0x00,0xBE,0x81

40

Ext_Module_Prm_Data_Len = 1

Ext_User_Prm_Data_Const(0) = 0x00

EndModule

Module="IC220MDL644*IN 24VDC 16PT"

0x42,0x01,0xBE,0x01

41

Ext_Module_Prm_Data_Len = 1

Ext_User_Prm_Data_Const(0) = 0x00

EndModule

,***** digital input modules, packed *****

Module="IN 24VDC POS 2PT (QTY.2)4 Bit"

0x43,0x00,0xBE,0xC2,0x02

42

Ext_Module_Prm_Data_Len = 2

Ext_User_Prm_Data_Const(0) = 0x00,0x00

EndModule

Module="IN 24VDC POS 2PT (QTY.3)6 Bit"

0x43,0x00,0xBE,0xC2,0x03

43

Ext_Module_Prm_Data_Len = 3

Ext_User_Prm_Data_Const(0) = 0x00,0x00,0x00

EndModule

Module="IN 24VDC POS 2PT (QTY.4)8 Bit"

0x43,0x00,0xBE,0xC2,0x04

44

Ext_Module_Prm_Data_Len = 4

Ext_User_Prm_Data_Const(0) = 0x00,0x00,0x00,0x00

EndModule

Module="IN 24VDC POS 4PT (QTY.2)8 Bit"

0x43,0x00,0xBE,0x41,0x02

45

Ext_Module_Prm_Data_Len = 2

Ext_User_Prm_Data_Const(0) = 0x00,0x00

EndModule

,***** analog output modules *****

Module="IC220ALG320*ALG OUT V/C 1CH"

0x82,0x40,0x7D,0x01

46

Ext_Module_Prm_Data_Len = 4

Ext_User_Prm_Data_Const(0) = 0x00,0x82,0x00,0x00

Ext_User_Prm_Data_Ref(0) = 122

Ext_User_Prm_Data_Ref(2) = 86

EndModule

Module="IC220ALG321*ALG OUT V 1CH"

0x82,0x40,0x7D,0x01

47

Ext_Module_Prm_Data_Len = 4

Ext_User_Prm_Data_Const(0) = 0x00,0x82,0x00,0x00

Ext_User_Prm_Data_Ref(0) = 122

Ext_User_Prm_Data_Ref(2) = 86

EndModule

Module="IC220ALG322*ALG OUT V 2CH"

0xC2,0x41,0x41,0x5B,0x02

48

Ext_Module_Prm_Data_Len = 6

Ext_User_Prm_Data_Const(0) =

0x00,0x84,0x00,0x00,0x00,0x00

Ext_User_Prm_Data_Ref(0) = 122

Ext_User_Prm_Data_Ref(2) = 45

Ext_User_Prm_Data_Ref(4) = 46

EndModule

,***** analog input modules *****

Module="IC220ALG220*ALG IN V/C 2CH"

0x42,0x41,0x7F,0x02

49

Ext_Module_Prm_Data_Len = 6

Ext_User_Prm_Data_Const(0) =

0x10,0x44,0x00,0x00,0x00,0x00

Ext_User_Prm_Data_Ref(2) = 1

Ext_User_Prm_Data_Ref(2) = 2

Ext_User_Prm_Data_Ref(3) = 3

Ext_User_Prm_Data_Ref(3) = 4

Ext_User_Prm_Data_Ref(4) = 5

Ext_User_Prm_Data_Ref(4) = 6

Ext_User_Prm_Data_Ref(5) = 7

Ext_User_Prm_Data_Ref(5) = 8

EndModule

Module="IC220ALG221*ALG IN V/C 8CH"

0xC2,0x41,0x41,0x5F,0x02

50

Ext_Module_Prm_Data_Len = 6

Ext_User_Prm_Data_Const(0) =

0x20,0x44,0x60,0x00,0x00,0x00

Ext_User_Prm_Data_Ref(4) = 75

```
Ext_User_Prm_Data_Ref(5) = 76
Ext_User_Prm_Data_Ref(5) = 77
EndModule
```

```
Module="IC220ALG620*ALG IN RTD 2CH"
0x42,0x41,0x7F,0x02
51
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x10,0x44,0x00,0x00,0x00,0x00
Ext_User_Prm_Data_Ref(2) = 1
Ext_User_Prm_Data_Ref(2) = 15
Ext_User_Prm_Data_Ref(2) = 16
Ext_User_Prm_Data_Ref(3) = 17
Ext_User_Prm_Data_Ref(3) = 10
Ext_User_Prm_Data_Ref(3) = 18
Ext_User_Prm_Data_Ref(4) = 5
Ext_User_Prm_Data_Ref(4) = 19
Ext_User_Prm_Data_Ref(4) = 20
Ext_User_Prm_Data_Ref(5) = 21
Ext_User_Prm_Data_Ref(5) = 13
Ext_User_Prm_Data_Ref(5) = 22
EndModule
```

```
Module="IC220ALG630*ALG IN THM 2CH"
0x42,0x41,0x7F,0x02
52
Ext_Module_Prm_Data_Len = 6
Ext_User_Prm_Data_Const(0) =
0x10,0x44,0x00,0x00,0x00,0x00
Ext_User_Prm_Data_Ref(2) = 1
Ext_User_Prm_Data_Ref(2) = 29
Ext_User_Prm_Data_Ref(3) = 9
Ext_User_Prm_Data_Ref(3) = 118
Ext_User_Prm_Data_Ref(3) = 11
Ext_User_Prm_Data_Ref(4) = 5
Ext_User_Prm_Data_Ref(4) = 33
Ext_User_Prm_Data_Ref(5) = 12
Ext_User_Prm_Data_Ref(5) = 119
Ext_User_Prm_Data_Ref(5) = 14
EndModule
```

```
***** power-level terminals *****
```

```
Module="IC220MDD850*IN THERMISTOR 1PT"
0x42,0x00,0xBE,0x41
53
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
```

```
EndModule
```

```
Module="IC220STR001*MSTR DIR 1.5KW/400"
0xC2,0x00,0x00,0xBF,0x81
54
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x20,0x41,0x00
Ext_User_Prm_Data_Ref(2) = 35
EndModule
```

```
Module="IC220STR003*MSTR REV 1.5KW/400"
0xC2,0x00,0x00,0xBF,0x81
55
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x20,0x41,0x00
Ext_User_Prm_Data_Ref(2) = 35
EndModule
```

```
Module="IC220STR002*MSTR DIR 3.7KW/400"
0xC2,0x00,0x00,0xBF,0x81
56
Ext_Module_Prm_Data_Len = 3
Ext_User_Prm_Data_Const(0) = 0x20,0x41,0x00
Ext_User_Prm_Data_Ref(2) = 36
EndModule
```

```
***** special function modules *****
```

```
Module="IC220MDD840*HSC 1IN/1OUT 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
57
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDD842*INC ENC IN 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
58
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220MDD841*ABS ENC IN 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
59
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```



```
Module=="IC220BEM485*SER COMM RS485 1CH"  
0xC2,0xC0,0xC0,0xDC,0x01  
  
61  
  
Ext_Module_Prm_Data_Len = 25  
  
Ext_User_Prm_Data_Const(0) =  
0x02,0xd7,0x5f,0xff,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00  
  
Ext_User_Prm_Data_Ref(5) = 87  
Ext_User_Prm_Data_Ref(6) = 88  
Ext_User_Prm_Data_Ref(7) = 89  
Ext_User_Prm_Data_Ref(10) = 90  
Ext_User_Prm_Data_Ref(11) = 91  
Ext_User_Prm_Data_Ref(12) = 92  
Ext_User_Prm_Data_Ref(13) = 93  
Ext_User_Prm_Data_Ref(14) = 98  
Ext_User_Prm_Data_Ref(16) = 95  
Ext_User_Prm_Data_Ref(17) = 96  
Ext_User_Prm_Data_Ref(18) = 97  
  
EndModule
```

```
Module="IC220PWR003*PWR TERM F-D 24VDC"
0x42,0x00,0xBE,0xC2
62
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```
Module="IC220PWR014*SEG TERM ELF 24VDC"
0x42,0x00,0xBE,0xC2
64
Ext_Module_Prm_Data_Len = 1
Ext_User_Prm_Data_Const(0) = 0x00
EndModule
```

```

; Byte 0 station state 1
; Byte 1 station state 2
; Byte 2 station state 3
; Byte 3 PROFIBUS master address
; Byte 4 00H (manufacturers ID high Byte)
; Byte 5 F0H (manufacturers ID low Byte)
; *****
; *****
; ***** device specific diagnostics (Status PDU format) *
; *****
; Byte 6 09H (Header Byte, number of following byte)
; Byte 7 81H (type of diagnostics - Status PDU)
; Byte 8 first faulted device (INTERBUS Inline Slot Number)
; Byte 9 Specifier (appeared / disappeared / no change)
; Byte 10 error type
; Byte 11 error number
; meaning of error type-error number:
; 1: parameterization error PROFIBUS
; 1-1: wrong slot number
; 1-2: parameter block (failsafe or configuration) is incomplete
; 1-3: data length of a parameter block is too small
; 1-4: data length of a parameter block is too large
; 1-5: internal block length (failsafe and configuration) is too
small
; 1-6: header byte of parameterblock is incorrect
; 1-7: PCP-initialization for a module without PCP
functionality
; 1-8: too many data blocks for the module
; 2: configuration error PROFIBUS

```

<pre> ; 2-1: less modules configured than connected ; 2-2: less modules connected than configured ; 2-3: 1st byte of special signature format is incorrect ; 2-4: for last module not enough byte of special signature format configured ; 2-5: sum of configured process data > 176 byte ; 2-6: different ID codes for configuration and module ; 2-7: different length codes for configuration and module ; 2-8: number of manufacturer specific data is incorrect ; 2-9: not enough output byte configured ; 2-10: not enough input byte configured ; 2-11: configuration of PROFIBUS needs more than 244 byte ; 2-12: internal list too small ; 3: configuration error INTERBUS Inline station ; 3-1: module type not allowed ; 3-2: module length code zero not allowed ; 3-3: module length code > 32 byte not allowed ; 3-4: Loop1 module not allowed ; 3-5: sum of INTERBUS process data too large (>250 Byte) ; 3-6: more than 64 modules connected ; 3-7: sum of PROFIBUS process data > 176 Byte ; 3-8: more than 8 PCP devices connected ; 4: INTERBUS error ; 4-1: local bus error (Data In) ; 4-2: local bus error (Data Out) ; 4-3: error can not be localized ; 4-4: INTERBUS Inline module not ready ; 4-5: new INTERBUS module has an incorrect length- or ID- code ; 4-6: additional INTERBUS Inline module(s) connected ; 5: module error ; 5-1: peripheral fault ; 6: parameterization error local bus ; 6-1: pcg telegram could not be send ; Byte 12 INTERBUS Inline ID code ; Byte 13 INTERBUS Inline length code ; Byte 14 Firmware revision, ASCII coded ; ***** ; ***** error location (Status PDU format) ***** Unit_Diag_Area = 8-15 Value(1) = "Module 1" Value(2) = "Module 2" Value(3) = "Module 3" Value(4) = "Module 4" Value(5) = "Module 5" Value(6) = "Module 6" </pre>	<pre> Value(7) = "Module 7" Value(8) = "Module 8" Value(9) = "Module 9" Value(10) = "Module 10" Value(11) = "Module 11" Value(12) = "Module 12" Value(13) = "Module 13" Value(14) = "Module 14" Value(15) = "Module 15" Value(16) = "Module 16" Value(17) = "Module 17" Value(18) = "Module 18" Value(19) = "Module 19" Value(20) = "Module 20" Value(21) = "Module 21" Value(22) = "Module 22" Value(23) = "Module 23" Value(24) = "Module 24" Value(25) = "Module 25" Value(26) = "Module 26" Value(27) = "Module 27" Value(28) = "Module 28" Value(29) = "Module 29" Value(30) = "Module 30" Value(31) = "Module 31" Value(32) = "Module 32" Value(33) = "Module 33" Value(34) = "Module 34" Value(35) = "Module 35" Value(36) = "Module 36" Value(37) = "Module 37" Value(38) = "Module 38" Value(39) = "Module 39" Value(40) = "Module 40" Value(41) = "Module 41" Value(42) = "Module 42" Value(43) = "Module 43" Value(44) = "Module 44" Value(45) = "Module 45" Value(46) = "Module 46" Value(47) = "Module 47" Value(48) = "Module 48" Value(49) = "Module 49" Value(50) = "Module 50" Value(51) = "Module 51" Value(52) = "Module 52" Value(53) = "Module 53" Value(54) = "Module 54" </pre>
---	--



```
Value(55) = "Module 55"
Value(56) = "Module 56"
Value(57) = "Module 57"
Value(58) = "Module 58"
Value(59) = "Module 59"
Value(60) = "Module 60"
Value(61) = "Module 61"
Value(62) = "Module 62"
Value(63) = "Module 63"
Value(64) = "Module 64"
Unit_Diag_Area_End

;***** specifier (Status PDU format) *****

Unit_Diag_Area = 16-23
Value(0) = "no change"
Value(1) = "Error appears"
Value(2) = "Error disappears"
Unit_Diag_Area_End

;***** error type *****

Unit_Diag_Area = 24-31
Value(1) = "#1-parameter error PROFIBUS"
Value(2) = "#2-PROFIBUS configuration error"
Value(3) = "#3-INTERBUS configuration error"
Value(4) = "#4-INTERBUS error"
Value(5) = "#5-module error"
Value(6) = "#6-parameter error local bus"
Unit_Diag_Area_End

;***** error number *****

Unit_Diag_Area = 32-39
Value(1) = "Error number: #1"
Value(2) = "Error number: #2"
```

```
Value(3) = "Error number: #3"
Value(4) = "Error number: #4"
Value(5) = "Error number: #5"
Value(6) = "Error number: #6"
Value(7) = "Error number: #7"
Value(8) = "Error number: #8"
Value(9) = "Error number: #9"
Value(10) = "Error number: #10"
Value(11) = "Error number: #11"
Unit_Diag_Area_End

;***** ID code *****

Unit_Diag_Area = 40-47
Value(189) = "ID code: 189" ; DO
Value(190) = "ID code: 190" ; DI, thermistor, power- and
segment terminals with diagnostics
Value(91) = "ID code: 91" ; AO
Value(125) = "ID code: 125" ; AO
Value(95) = "ID code: 95" ; AI
Value(127) = "ID code: 127" ; AI
Value(191) = "ID code: 191" ; motor starter, special function
module
Unit_Diag_Area_End

;***** length code *****

Unit_Diag_Area = 48-55
Value(1) = "Data length: 1 word"
Value(2) = "Data length: 2 words"
Value(65) = "Data length: 4 Bit"
Value(129) = "Data length: 1 Byte"
Value(194) = "Data length: 2 Bit"
Unit_Diag_Area_End
```

GSD File for NIU Version IC220PBI001

Use this file for NIU version module IC220PBI001.

This file should also be used for module IC220PBI002 when DIP switch 8 is in the Off position. See chapter 4 for more information about setting this switch.

```

;*****
; GSD-File for VersaPoint PROFIBUS-DP NETWORK
INTERFACE UNIT
; Manufacturer   : GE Intelligent Platforms North America
; Article-No.    : IC220PBI001-AA
; Hardware-Release : 02
; Firmware-Release : A (41 hex)
; GSD-Revision   : 1.03
; Date          : 31.01.2003
;*****
;***** History *****
; Revision   Change
; 1.00      -initial product release
; 1.01      -corrected entry for 2ch analog output module
; 1.02      -new modules added
; 1.03      -new modules added, module discription changed
;*****

#Profibus_DP
GSD_REVISION = 2          ; version ID of the GSD file
format
Vendor_Name = "GE "      ; manufacturer name
Model_Name = "VersaPoint Profibus NIU" ; device name
Revision = "V2.0"        ; device revision
Ident_Number = 0x05B9    ; product ID
Slave_Family = 3         ; device family class
Protocol_Ident = 0       ; protocol ID of the device
Station_Type = 0         ; device type
FMS_supp = 0            ; no DP/FMS mixed device
Hardware_Release = "V2.0" ; hardware revision
Software_Release = "A"   ; software revision
Bitmap_Device = "GEF05B9N" ; device bitmap - normal
state
;Bitmap_DIAG = "GEF05B9D" ; device bitmap - diagnostic
state

9.6_supp = 1            ; supported baudrates
19.2_supp = 1
93.75_supp = 1
187.5_supp = 1

```

```

500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1

MaxTsdrr_9.6 = 60      ; device response times
MaxTsdrr_19.2 = 60
MaxTsdrr_93.75 = 60
MaxTsdrr_187.5 = 60
MaxTsdrr_500 = 100
MaxTsdrr_1.5M = 150
MaxTsdrr_3M = 250
MaxTsdrr_6M = 550
MaxTsdrr_12M = 850

Redundancy = 0          ; no redundancy
Repeater_Ctrl_Sig = 2   ; connector signal CNTR-P:
TTL level

;*****
;***** slavespecific data *****
;*****

Freeze_Mode_supp = 1    ; device supports freeze
mode
Sync_Mode_supp = 1      ; device supports sync mode
Auto_Baud_supp = 1      ; automatic baud rate
recognition
Min_Slave_Intervall = 1 ; min cycle time 0.1ms
User_Prm_Data_Len = 0    ; length of User_Prm_Data
Max_Diag_Data_Len = 16   ; max length of diagnostic
data

;*****
;***** modular device *****
;*****

Modular_Station = 1      ; modular device
Max_Module = 64          ; max 64 modules

```



Max_Input_Len = 184 ; max 184 bytes input data
Max_Output_Len = 184 ; max 184 bytes output data
Max_Data_Len = 184 ; max sum: 184 bytes input and
output data

;***** digital output modules *****

```
Module="IC220MDL930*OUT RELAY 3A 1PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL940*OUT RELAY 3A 4PT"  
0x82,0x00,0xBD,0x41  
EndModule  
Module="IC220MDL931*OUT RELAY 3A PC 1PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL941*OUT RELAY 3A PC 4PT"  
0x82,0x00,0xBD,0x41  
EndModule  
Module="IC220MDL350*OUT VAC 0.5A 1PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL350*OUT VAC 1A 4PT"  
0x82,0x00,0xBD,0x41  
EndModule  
Module="IC220MDL751*OUT 24VDC .5A 2PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL721*OUT 24VDC 2A 2PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL761*OUT 24VDC NEG 2PT"  
0x82,0x00,0xBD,0xC2  
EndModule  
Module="IC220MDL771*OUT 24VDC DIAG 2PT"  
0xC2,0x00,0x00,0xBF,0x41  
EndModule  
Module="IC220MDL752*OUT 24VDC .5A 4PT"  
0x82,0x00,0xBD,0x41  
EndModule  
Module="IC220MDL753*OUT 24VDC .5A 8PT"  
0x82,0x00,0xBD,0x81  
EndModule  
Module="IC220MDL723*OUT 24VDC 2A 8PT"  
0x82,0x00,0xBD,0x81  
EndModule  
Module="IC220MDL754*OUT 24VDC .5A 16PT"  
0x82,0x01,0xBD,0x01  
EndModule
```

;***** digital output modules, packed *****

```
Module="OUT RELAY 1PT QTY.2/4Bit"  
0x83,0x00,0xBD,0xC2,0x02  
EndModule  
Module="OUT RELAY 1PT QTY.3/6Bit"  
0x83,0x00,0xBD,0xC2,0x03  
EndModule  
Module="OUT RELAY 1PT QTY.4/8Bit"  
0x83,0x00,0xBD,0xC2,0x04  
EndModule  
Module="OUT RELAY 4PT QTY.2/8Bit"  
0x83,0x00,0xBD,0x41,0x02  
EndModule  
Module="OUT VAC 1PT QTY.2/4Bit"  
0x83,0x00,0xBD,0xC2,0x02  
EndModule  
Module="OUT VAC 1PT QTY.3/6Bit"  
0x83,0x00,0xBD,0xC2,0x03  
EndModule  
Module="OUT VAC 1PT QTY.4/8Bit"  
0x83,0x00,0xBD,0xC2,0x04  
EndModule  
Module="OUT VAC 4PT QTY.2/8Bit"  
0x83,0x00,0xBD,0x41,0x02  
EndModule  
Module="OUT 24VDC POS/NEG 2PT QTY.2/4Bit"  
0x83,0x00,0xBD,0xC2,0x02  
EndModule  
Module="OUT 24VDC POS/NEG 2PT QTY.3/6Bit"  
0x83,0x00,0xBD,0xC2,0x03  
EndModule  
Module="OUT 24VDC POS/NEG 2PT QTY.4/8Bit"  
0x83,0x00,0xBD,0xC2,0x04  
EndModule  
Module="OUT 24VDC POS 4PT QTY.2/8Bit"  
0x83,0x00,0xBD,0x41,0x02  
EndModule
```

;***** digital input modules *****

```
Module="IC220MDL220*IN 120VAC 1PT"  
0x42,0x00,0xBE,0xC2  
EndModule  
Module="IC220MDL230*IN 230VAC 1PT"  
0x42,0x00,0xBE,0xC2  
EndModule  
Module="IC220MDL641*IN 24VDC 2PT"  
0x42,0x00,0xBE,0xC2  
EndModule  
Module="IC220MDL661*IN 24VDC NEG 2PT"  
0x42,0x00,0xBE,0xC2  
EndModule
```

```

Module="IC220MDL651*IN 24VDC 2PT DESINA"
0x42,0x00,0xBE,0x41
EndModule
Module="IC220MDL642*IN 24VDC 4PT"
0x42,0x00,0xBE,0x41
EndModule
Module="IC220MDL643*IN 24VDC 8PT"
0x42,0x00,0xBE,0x81
EndModule
Module="IC220MDL644*IN 24VDC 16PT"
0x42,0x01,0xBE,0x01
EndModule

```

```

;***** digital input modules, packed *****

```

```

Module="IN 120/230VAC 1PT QTY.2/4Bit"
0x43,0x00,0xBE,0xC2,0x02
EndModule
Module="IN 120/230VAC 1PT QTY.3/6Bit"
0x43,0x00,0xBE,0xC2,0x03
EndModule
Module="IN 120/230VAC 1PT QTY.4/8Bit"
0x43,0x00,0xBE,0xC2,0x04
EndModule
Module="IN 24VDC POS/NEG 2PT QTY.2/4Bit"
0x43,0x00,0xBE,0xC2,0x02
EndModule
Module="IN 24VDC POS/NEG 2PT QTY.3/6Bit"
0x43,0x00,0xBE,0xC2,0x03
EndModule
Module="IN 24VDC POS/NEG 2PT QTY.4/8Bit"
0x43,0x00,0xBE,0xC2,0x04
EndModule
Module="IN 24VDC POS 4PT QTY.2/8Bit"
0x43,0x00,0xBE,0x41,0x02
EndModule

```

```

;***** analog output modules *****

```

```

Module="IC220ALG320*ALG OUT V/C 1CH"
0x82,0x40,0x7D,0x01
EndModule
Module="IC220ALG321*ALG OUT V 1CH"
0x82,0x40,0x7D,0x01
EndModule
Module="IC220ALG322*ALG OUT V 2CH"
0xC2,0x41,0x41,0x5B,0x02
EndModule

```

```

;***** analog input modules *****

```

```

Module="IC220ALG220*ALG IN V/C 2CH"
0xC2,0x41,0x41,0x7F,0x02
EndModule
Module="IC220ALG221*ALG IN V/C 8CH"
0xC2,0x41,0x41,0x5F,0x02
EndModule
Module="IC220ALG620*ALG IN RTD 2CH"
0xC2,0x41,0x41,0x7F,0x02
EndModule
Module="IC220ALG630*ALG IN THM 2CH"
0xC2,0x41,0x41,0x7F,0x02
EndModule

```

```

;***** power-level terminals *****

```

```

Module="IC220MDD850*IN THERMISTOR 1PT"
0x42,0x00,0xBE,0x41
EndModule
Module="IC220STR001*MSTR DIR 1.5KW/400"
0xC2,0x00,0x00,0xBF,0x81
EndModule
Module="IC220STR003*MSTR REV 1.5KW/400"
0xC2,0x00,0x00,0xBF,0x81
EndModule
Module="IC220STR002*MSTR DIR 3.7KW/400"
0xC2,0x00,0x00,0xBF,0x81
EndModule

```

```

;***** special funcon modules *****

```

```

Module="IC220MDD840*HSC 1IN/1OUT 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
EndModule
Module="IC220MDD842*INC ENC IN 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
EndModule
Module="IC220MDD841*ABS ENC IN 24VDC"
0xC2,0xC1,0xC1,0xBF,0x02
EndModule
Module="IC220BEM232*SER COMM RS232 1CH"
0xC2,0xC0,0xC0,0xDC,0x01
EndModule
Module="IC220BEM485*SER COMM RS485 1CH"
0xC2,0xC0,0xC0,0xDC,0x01
EndModule
;***** power- and segment terminals *****

```

```

Module="IC220PWR003*PWR TERM F-D 24VDC"
0x42,0x00,0xBE,0xC2

```



```
EndModule
Module="IC220PWR013*SEG TERM F-D 24VDC"
0x42,0x00,0xBE,0xC2
EndModule
Module="IC220PWR014*SEG TERM ELF 24VDC"
0x42,0x00,0xBE,0xC2
EndModule

;*****
;***** device diagnostics *****
;*****

;***** PROFIBUS standard diagnostics *****
; Byte 0 station state 1
; Byte 1 station state 2
; Byte 2 station state 3
; Byte 3 PROFIBUS master address
; Byte 4 00H (manufacturers ID high Byte)
; Byte 5 00H (manufacturers ID low Byte)
;*****

;***** device specific diagnostics *****
;*****
; Byte 6 0AH (Header Byte, number of following byte)
; Byte 7 00H (type of diagnostics)
; Byte 8 firmware revision, ASCII coded
; Byte 9 error type
; Byte 10 error number
; meaning of error type-error number:
; 1: parameterization error PROFIBUS
; 2: configuration error PROFIBUS
; 2-1: less modules configured than connected
; 2-2: more modules configured than connected
; 2-3: 1st byte of special signature format is incorrect
; 2-4: for last module not enough byte of special signature format
configured
; 2-5: sum of configured process data > 184 byte
; 2-6: different ID codes for configuration and module
; 2-7: different length codes for configuration and module
; 2-8: number of manufacturer specific data is incorrect
; 2-9: not enough output bytes configured
; 2-10: not enough input bytes configured
; 2-11: configuration of PROFIBUS needs more than 244 bytes
; 3: configuration error local bus station
; 3-1: module not allowed
; 3-2: module length code is zero
; 3-3: module length code > 32 byte
; 3-4: module not allowed
```

```
; 3-5: sum of local bus process data too large
; 3-6: more than 64 modules connected
; 3-7: sum of PROFIBUS process data > 184 Byte
; 4: local bus error
; 4-1: local bus error (Data In)
; 4-2: local bus error (Data Out)
; 4-3: error can not be localized
; 4-4: localbus module not ready
; 4-5: new local bus module has an incorrect length- or ID-
code
; 4-6: additional local bus module connected
; 5: module error
; 5-1: peripheral fault
; Byte 11 local bus module before fault (or module with
peripheral fault)
; Byte 12 local bus module after fault (or module with
peripheral fault)
; Byte 13 local bus module ID code
; Byte 14 local bus module length code
; Byte 15 reserved
;*****

;***** error type *****

Unit_Diag_Area = 16-23
Value(1) = "#1-parameter error PROFIBUS"
Value(2) = "#2-PROFIBUS configuration error"
Value(3) = "#3-local bus configuration error"
Value(4) = "#4-local bus error"
Value(5) = "#5-module error"
Unit_Diag_Area_End

;***** error number *****

Unit_Diag_Area = 24-31
Value(1) = "Error number: #1"
Value(2) = "Error number: #2"
Value(3) = "Error number: #3"
Value(4) = "Error number: #4"
Value(5) = "Error number: #5"
Value(6) = "Error number: #6"
Value(7) = "Error number: #7"
Value(8) = "Error number: #8"
Value(9) = "Error number: #9"
Value(10) = "Error number: #10"
Value(11) = "Error number: #11"
Unit_Diag_Area_End

;***** error location start *****
```

```

Unit_Diag_Area = 32-39
Value(1) = "Module 1"
Value(2) = "Module 2"
Value(3) = "Module 3"
Value(4) = "Module 4"
Value(5) = "Module 5"
Value(6) = "Module 6"
Value(7) = "Module 7"
Value(8) = "Module 8"
Value(9) = "Module 9"
Value(10) = "Module 10"
Value(11) = "Module 11"
Value(12) = "Module 12"
Value(13) = "Module 13"
Value(14) = "Module 14"
Value(15) = "Module 15"
Value(16) = "Module 16"
Value(17) = "Module 17"
Value(18) = "Module 18"
Value(19) = "Module 19"
Value(20) = "Module 20"
Value(21) = "Module 21"
Value(22) = "Module 22"
Value(23) = "Module 23"
Value(24) = "Module 24"
Value(25) = "Module 25"
Value(26) = "Module 26"
Value(27) = "Module 27"
Value(28) = "Module 28"
Value(29) = "Module 29"
Value(30) = "Module 30"
Value(31) = "Module 31"
Value(32) = "Module 32"
Value(33) = "Module 33"
Value(34) = "Module 34"
Value(35) = "Module 35"
Value(36) = "Module 36"
Value(37) = "Module 37"
Value(38) = "Module 38"
Value(39) = "Module 39"
Value(40) = "Module 40"
Value(41) = "Module 41"
Value(42) = "Module 42"
Value(43) = "Module 43"
Value(44) = "Module 44"
Value(45) = "Module 45"
Value(46) = "Module 46"
Value(47) = "Module 47"

```

```

Value(48) = "Module 48"
Value(49) = "Module 49"
Value(50) = "Module 50"
Value(51) = "Module 51"
Value(52) = "Module 52"
Value(53) = "Module 53"
Value(54) = "Module 54"
Value(55) = "Module 55"
Value(56) = "Module 56"
Value(57) = "Module 57"
Value(58) = "Module 58"
Value(59) = "Module 59"
Value(60) = "Module 60"
Value(61) = "Module 61"
Value(62) = "Module 62"
Value(63) = "Module 63"
Value(64) = "Module 64"
Unit_Diag_Area_End

```

```

;***** error location end *****

```

```

Unit_Diag_Area = 40-47
Value(1) = "-Module 1"
Value(2) = "-Module 2"
Value(3) = "-Module 3"
Value(4) = "-Module 4"
Value(5) = "-Module 5"
Value(6) = "-Module 6"
Value(7) = "-Module 7"
Value(8) = "-Module 8"
Value(9) = "-Module 9"
Value(10) = "-Module 10"
Value(11) = "-Module 11"
Value(12) = "-Module 12"
Value(13) = "-Module 13"
Value(14) = "-Module 14"
Value(15) = "-Module 15"
Value(16) = "-Module 16"
Value(17) = "-Module 17"
Value(18) = "-Module 18"
Value(19) = "-Module 19"
Value(20) = "-Module 20"
Value(21) = "-Module 21"
Value(22) = "-Module 22"
Value(23) = "-Module 23"
Value(24) = "-Module 24"
Value(25) = "-Module 25"
Value(26) = "-Module 26"

```

D

Value(27) = "-Module 27"
 Value(28) = "-Module 28"
 Value(29) = "-Module 29"
 Value(30) = "-Module 30"
 Value(31) = "-Module 31"
 Value(32) = "-Module 32"
 Value(33) = "-Module 33"
 Value(34) = "-Module 34"
 Value(35) = "-Module 35"
 Value(36) = "-Module 36"
 Value(37) = "-Module 37"
 Value(38) = "-Module 38"
 Value(39) = "-Module 39"
 Value(40) = "-Module 40"
 Value(41) = "-Module 41"
 Value(42) = "-Module 42"
 Value(43) = "-Module 43"
 Value(44) = "-Module 44"
 Value(45) = "-Module 45"
 Value(46) = "-Module 46"
 Value(47) = "-Module 47"
 Value(48) = "-Module 48"
 Value(49) = "-Module 49"
 Value(50) = "-Module 50"
 Value(51) = "-Module 51"
 Value(52) = "-Module 52"
 Value(53) = "-Module 53"
 Value(54) = "-Module 54"
 Value(55) = "-Module 55"
 Value(56) = "-Module 56"
 Value(57) = "-Module 57"
 Value(58) = "-Module 58"

Value(59) = "-Module 59"
 Value(60) = "-Module 60"
 Value(61) = "-Module 61"
 Value(62) = "-Module 62"
 Value(63) = "-Module 63"
 Value(64) = "-Module 64"
 Unit_Diag_Area_End

;***** ID code *****

Unit_Diag_Area = 48-55

Value(189) = "ID code: 189" ; DO
 Value(190) = "ID code: 190" ; DI, thermistor, power- and
 segment terminals with diagnostics
 Value(91) = "ID code: 91" ; AO
 Value(125) = "ID code: 125" ; AO
 Value(95) = "ID code: 95" ; AI
 Value(127) = "ID code: 127" ; AI
 Value(191) = "ID code: 191" ; motor starter, special
 function module
 Unit_Diag_Area_End

;***** length code *****

*****Unit_Diag_Area = 56-63

Value(1) = "Data length: 1 word"
 Value(2) = "Data length: 2 words"
 Value(65) = "Data length: 4 Bit"
 Value(129) = "Data length: 1 Byte"
 Value(194) = "Data length: 2 Bit"
 Unit_Diag_Area_End

;

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